

Integrated Solid Waste Management Plan Update

County of Kaua'i
Department of Public Works, Solid Waste Division

November 2021

Acknowledgments

Kaua'i County wishes to acknowledge the following people and groups who contributed their time and effort to the publishing of this 2021 *County of Kaua'i Integrated Solid Waste Management Plan Update*.

- Hawai'i Department of Health, Solid and Hazardous Waste Branch, Lane Otsu
- Mayor Derek S. K. Kawakami
- Managing Director Michael A. Dahilig
- Acting County Engineer Troy K. Tanigawa
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- Kaua'i County Solid Waste Advisory Committee
- Zero Waste Kaua'i

Executive Summary

Chapter 342G of the Hawai'i Revised Statutes (HRS) requires each county to develop an Integrated Solid Waste Management Plan (ISWMP, or Plan) to be revised once every 10 years, provided that an interim status report is submitted 5 years after every revised Plan submission. As the County of Kaua'i (County) recognizes the value of a comprehensive waste prevention, recycling, composting, and disposal program, the County has developed (and periodically updates) their ISWMP to determine the most effective combined strategy for managing solid waste while protecting human health and the environment. Updating the Plan every 10 years requires significant effort on the part of the County to compile information and data that are used to assess the existing solid waste system and develop a feasible plan for the next 10 years and beyond. The process of an ISWMP update typically spans more than a year because of the required careful consideration of stakeholder input throughout the development of the Plan combined with the HRS requirements for specific review periods.

A Solid Waste Advisory Committee (SWAC) was appointed by the Mayor to guide the Plan's direction and assure that it provides a holistic reflection of the priorities of the County of Kaua'i. Five SWAC meetings were held to discuss and solicit feedback on the Plan's content, with multiple drafts issued for stakeholder reviews. Ultimately, the Plan must be approved by the State of Hawai'i Department of Health (HDOH) and then adopted by the County.

It is important to note that information included in the Plan is based on data obtained before the emergence of the 2019 novel coronavirus disease (COVID-19). The full implications of COVID-19 on waste generation and diversion or the County budget are not currently known. The County may choose to revisit these planning estimates and make any necessary adjustments at a later date.

Introduction

The County oversees numerous programs and policies that allow the solid waste management system to function, many of which are interconnected and reliant on each other. The County's existing solid waste management system includes the following main components:

- Solid waste collection.
- Source reduction.
- Recycling and bioconversion.
- Special waste management.
- Household hazardous waste (HHW) and electronic waste (eWaste) management.
- Public education.
- Refuse transfer stations (RTSs).
- Kaua'i Resource Center (KRC).
- Kekaha Municipal Solid Waste Landfill (Kekaha Landfill).

The main facilities that offer solid waste management services on Kaua'i are shown on Figure ES-1.

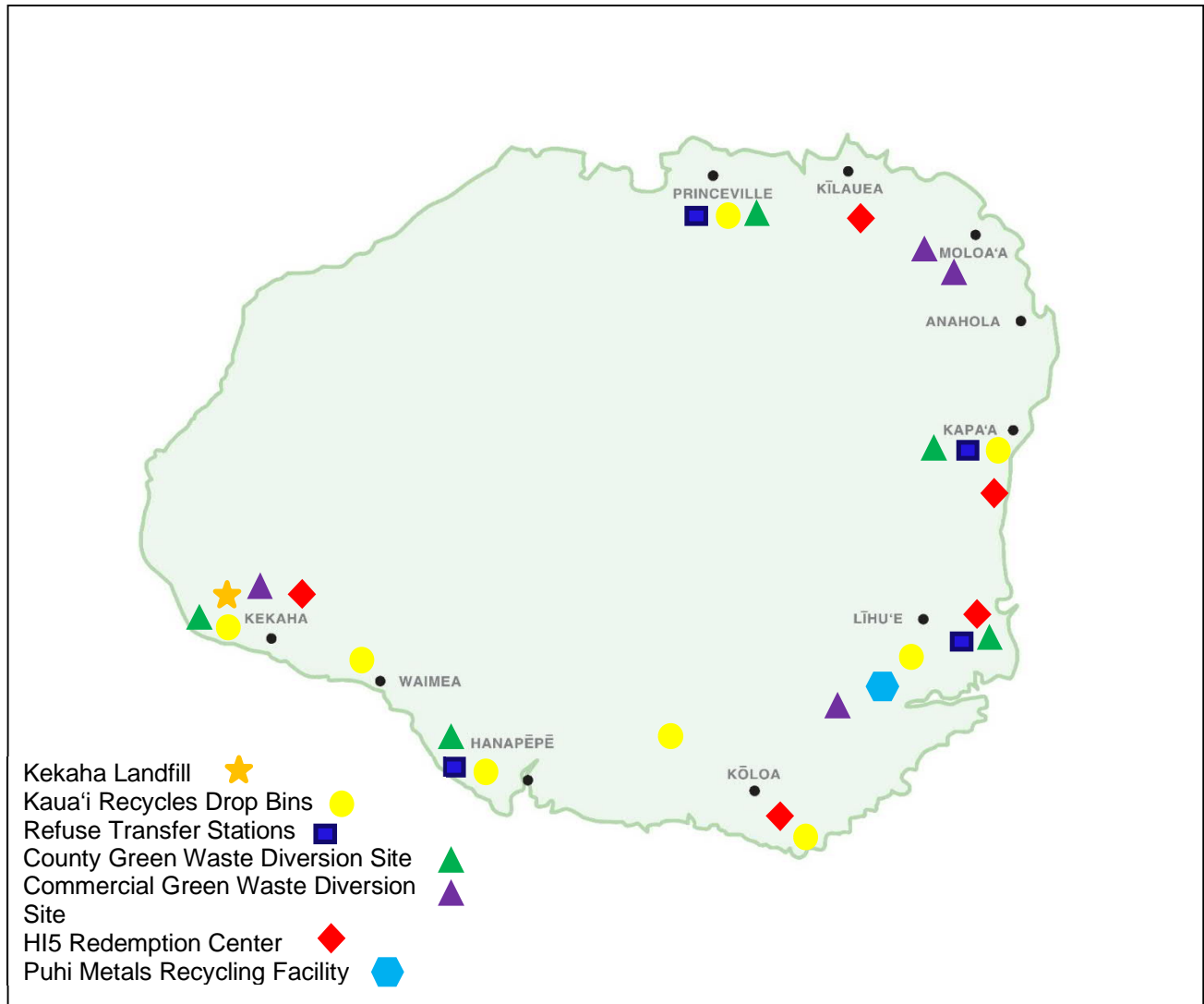


Figure ES-1. County of Kaua'i Solid Waste Management Facilities

Since the previous Plan was adopted, the County has implemented a number of major system improvements that include the following:

- Automated refuse collection.
- A flat fee for refuse service.
- A pay as you throw (PAYT) program.
- Commercial landfill restrictions.
- A plastic bag law.

This Plan update provides a strategy for implementing environmentally prudent and economically feasible integrated solid waste management components to enhance or upgrade the County's existing systems. The Plan begins with an overview of Kaua'i's existing solid waste management system (Section 1) and a look at the current and projected waste stream (Section 2). Sections 3 through 7 discuss individual elements of the County's solid waste management system with an emphasis on future enhancement opportunities. A discussion of existing markets for post-consumer materials, methods to increase access to markets, and strategies for promoting procurement of recycled materials is presented in Section 8. Section 9 includes information about RTs, the Kekaha Landfill, the facility siting process, and enterprise zones. Section 10 provides an evaluation of long-term disposal options and alternative waste disposal technologies. An energy balance, quantifying the energy required to run the current solid waste system

and investigating the energy impacts of future system changes, is presented in Section 11. The revenues and expenses required to manage the system are addressed in Section 12, and Section 13 contains an implementation strategy, which identifies ongoing and planned initiatives for the 10-year period leading up to the next iteration of the Plan (fiscal year [FY] 2020 through FY 2029).

Key Components of the Existing System

During the Plan's development, the following components of the County's solid waste system were determined to be critical to continued successful management:

- **Solid Waste Collection:**
 - Residential Collection – The County is responsible for weekly curbside collection of municipal solid waste (MSW) from all residences in the County, including single-family and multi-unit dwellings (22,447 households in FY 2019).¹ In July 2015, all Kaua'i residents transitioned to automated refuse collection, which is more efficient and less costly than the previous manual refuse collection system. Kaua'i County's Residential Refuse Collection Assessment (RRCA) is a PAYT program that went into effect in July 2015. Residents pay a variable rate for refuse collection, which is assessed via their property tax bill.² A variable rate service structure provides an economic incentive for reducing trash and increasing waste diversion and recycling. Most County collection vehicles unload at the County RTSs where the refuse is compacted into open-top transfer trailers and taken to the Kekaha Landfill, located on the western side of the island. In the Kekaha area, County collection vehicles go directly to the landfill to unload.
 - Commercial Collection – In FY 2019, the County collected refuse from approximately 269 commercial and transient vacation rental refuse collection customers who have opted in for service.³ The commercial businesses that do not subscribe to the County's collection service contract with private haulers, or the businesses self-haul their refuse to an RTS or the landfill. Private haulers are not licensed by the County or the State. Currently, there are a handful of private haulers providing commercial refuse collection in the County.
- **Source Reduction:** The County's existing source reduction efforts focus on providing public education and awareness of existing programs, resources, tools, and regulatory mechanisms that promote source reduction and encourage residents and businesses to prevent waste at the source. County agencies participate in a number of source reduction practices to increase awareness of waste diversion issues and decrease waste generation. There also many businesses in the County that are involved in sourced reduction activities by providing opportunities for residents to reuse items rather than buying new products. Examples of these types of businesses include thrift stores, building supply reuse, trade radio, food banks, reuse of packaging and shipping materials, supply of food to pig farms, and vermiculture. The County has implemented a variety of programs and services that promote source reduction. These include partnership with thrift stores, education, home and backyard composting, waste assessments, the Zero Waste Resolution, a plastic bag reduction ordinance, and the PAYT program.
- **Recycling:**
 - The County has a voluntary recycling program (that is, residents are not mandated to recycle). Currently there are eight drop-off sites in the County for the collection of the following items generated by residents (commercially generated materials are not accepted in the bins):
 - Corrugated cardboard.
 - Glass bottles and jars.
 - Aluminum and steel cans.
 - Plastic #1 and #2 bottles and jars.
 - Mixed paper, including newspaper and boxboard.

¹ Information provided by County of Kaua'i staff. March 21, 2020.

² County of Kaua'i. 2020. Residential Refuse Collection Assessment. <https://www.kauai.gov/RRCA>.

³ Information provided by County of Kaua'i staff. March 21, 2020.

- The County has a contract with Garden Isle Disposal (GID) to operate the program, which includes providing and maintaining the recycling drop bins, hauling recyclables when the bins are full, collecting office paper from the County's office buildings, processing all materials, and marketing the materials. In addition to the bins described above, the program includes bins for cardboard collection at the Civic Center and the police complex and bins at the Civic Center for collection of cans and bottles not covered under the deposit beverage container (DBC) program, commonly referred to as HI5. Most of the recyclable materials are transported off-island to markets. GID retains any revenue from the sale of recyclable material. Glass is crushed and available for reuse applications such as construction backfill, cesspool fill, asphalt mix, water filtration, and sandblasting. More information on glass recovery and recycling is included in Section 1.6.1.5 of the text under Other Recycling Programs.
 - Deposit Beverage Container Program – Within the state, a 5-cent deposit per beverage container is charged for the purchase of specific glass, aluminum, and plastic containers defined under the law. A 1-cent non-refundable container fee is also assessed to support the costs of recycling and program administration. Beverages included under the law are soft drinks, beer, drinks with limited alcoholic content, juices, water, teas, and sports drinks. Excluded beverages include but are not limited to wine, milk, and hard liquor. There are five privately operated certified redemption centers (CRCs) throughout the County. Currently redemption center operators are transporting most of the redeemed DBCs to GID in Līhu'e for processing and marketing (one exception is Kaua'i Community Recycling Services, which currently processes and markets its own aluminum).
 - Puhi Metals Recycling Center – The Puhi Metals Recycling Center is privately operated by Resource Recovery Solutions, LLC. The center accepts and recycles appliances (with or without refrigerant), scrap ferrous metals, tin and steel cans, depressurized propane tanks, vehicles, and small motorized goods such as scooters, lawnmowers, and motorcycles from the County, the general public, and commercial entities. The services are provided free of charge to residential users and for a fee to commercial users.⁴
 - Business Recycling – There are a mix of large and small commercial refuse haulers in the County. GID is the largest commercial refuse hauler in the County and also offers recycling hauling services to businesses for a fee. GID also has a contract with the County to accept and process commercially generated recyclables at their facility. The following materials are accepted for recycling by GID and processed at their facility in Līhu'e:
 - Corrugated cardboard.
 - Glass bottles and jars.
 - Aluminum and steel cans.
 - Plastic #1 and #2 bottles and jars.
 - Mixed paper, including newspaper and boxboard.The contract also includes the acceptance and processing of HI5 recyclables from CRC operators and requires all of the documentation for State reimbursement for the CRCs.
 - Other Recycling Programs – There are several other recycling programs that cover scrap metal (accepted at all RTSs), backhauling, Advance Deposit Fee (ADF) glass recovery and recycling, electronic waste (eWaste), technical assistance to businesses.
- Bioconversion: The County has a voluntary green waste diversion program that allows residents to divert green waste free of charge at any of the four RTSs or at the landfill. Commercial haulers can also divert green waste at all RTSs for a fee.
 - Kaua'i Resource Center: The County owns and operates the KRC. The KRC serves as a HI5 CRC, education center, and office facility for County staff. There are a number of programs run by the County out of the KRC.

⁴ eWaste is accepted from residents and businesses for recycling free of charge with no quantity limits. Additional information regarding eWaste is provided in Section 6.

- **Special Waste Management:** HRS Section 342G-1 defines special waste as “any solid waste that, because of its source or physical, chemical or biological characteristics, requires special consideration for its proper processing or disposal or both.” Per Chapter 21 of the Kaua'i County Code, special wastes include “tires, asbestos-containing materials, white goods, and dead animals (except those disposed of by the Kaua'i Humane Society), and any mixed waste containing used tires, asbestos-containing materials, white goods, or dead animals.” Special waste is managed by the County (details within Section 5 of the text).
- **Household Hazardous Waste:** Since 2002, the County has sponsored semiannual HHW collection events for residents to dispose of dangerous, poisonous, toxic, flammable, and other potentially harmful products free of charge. Commercial and institutional waste is not accepted. Currently, no hazardous waste management facilities are located in the County.
- **Electronic Waste:** Electronic waste, or eWaste, includes discarded computers, cell phones, televisions, and other electronic products. The Puhi Metals Recycling Center accepts eWaste free of charge. The program is open to residents and businesses with no restrictions on quantity. Collected items are shipped off-island to end destination recyclers.⁵
- **Public Education:** The County's public education efforts focus on raising public awareness of existing programs, resources, and regulations that promote waste management, source reduction, and recycling practices on Kaua'i. The County employs one recycling coordinator and a solid waste programs coordinator to manage the County's recycling program. These positions are responsible for implementing the majority of the County's public outreach and education initiatives.
- **RTS:** The County accepts MSW, green waste, and specified recyclable materials from residents at the four RTSs free of charge. Accepted recyclable materials include tires, motor oil, scrap metal, appliances,⁶ motor oil filters, and propane tanks. Residential recycling bins are offered at Hanalei RTS and Hanapēpē RTS. Bulky items, such as mattresses and furniture with at least one dimension bigger than 3 feet, are only accepted at Līhu'e RTS and the Kekaha Landfill.⁷ Commercial businesses and other non-residential entities are required to pay to dispose of MSW and divert green waste at the County's RTSs. The Plan includes an assessment of RTS capacity and future needs. Currently, the quantities of waste accepted at the Hanapēpē, Kapa'a, and Hanalei RTSs are well within the permitted capacities, and these RTSs are not expected to exceed permitted capacities within the next 10 years. Both 2019 and projected 2030 Līhu'e RTS waste receipt tonnages exceed the current HDOH solid waste management permit daily waste receipt limit. However, it is expected that the County will be able to remedy the capacity exceedance via a permit modification and facility modifications will not be required to handle the additional tonnage.
- **MSW Landfill –** The Kekaha Landfill is located on the leeward coastline of Kaua'i near the town of Kekaha. It is currently the primary solid waste disposal site on the island and is owned and operated by the County. Prior to December 2019, Landfill operations and monitoring services were contracted to Waste Management Hawaii (WMH). The landfill receives mixed rubbish, green waste, specified recyclables, mixed construction and demolition material, contaminated cardboard, sewage sludge/grit/sand, asbestos, dead animals, contaminated soils, solidified grease, and medical waste. The County accepts self-haul MSW, green waste, and specified recyclable materials from residents free of charge. The future of the landfill is tied to the remaining airspace, the future rate of waste received, and the amount of compaction achieved. Without further action, the Kekaha Landfill is projected to reach capacity in less than 6.5 years from January 2021. Siting, permitting, and construction of a new landfill typically takes approximately 10 years; therefore, it is critical for the County to take action as soon as possible to find a way to increase disposal capacity at the Kekaha Landfill or identify an alternate disposal option.

⁵ County of Kaua'i. n.d. Electronics Recycling. <https://www.kauai.gov/eWaste>.

⁶ Līhu'e RTS does not accept appliances. Residents can drop them off free of charge at Puhi Metals Recycling Center.

⁷ County of Kaua'i. 2020. Refuse Transfer Stations. <https://www.kauai.gov/TransferStations>.

Solid Waste Generation and Composition

The planning period for this ISWMP is from FY 2021 through 2030, with 2019 being the baseline year (that is, the existing conditions) and FY 2021 being the first year of Plan implementation. FY 2019 was the most recent year with complete data on the existing solid waste management system when the County began preparing the Plan.

The size of the population is one important factor that influences the amount of waste generated in a geographic area: the greater the population, the greater the generated solid waste. Economic growth, income levels, and construction activity are other factors that affect solid waste generation. During the 2021 to 2030 planning period, forecast average annual growth rates are 1.0 percent for the resident population, 2.0 percent for daily visitors, and 1.3 percent for the de facto population.

Current (baseline) waste generation during FY 2019 in the County is the sum of waste disposed of at the Kekaha Landfill and material diverted county-wide. The tons diverted is a combination of FY 2019 residential data collected by the County and estimated commercial data. The commercial diversion estimate is based on FY 2016 data collected by the County projected to FY 2019 using the percent change in disposal from FY 2016 to FY 2019 (approximately 9 percent). Based on a generation quantity of 158,659 tons and a de facto population of 102,621, the per capita generation rate per day is 8.47 pound per capita per day, as follows.

The County has been successful in establishing a variety of solid waste diversion programs. In FY 2019, this resulted in 67,593 tons of materials diverted from the Kekaha Landfill.

The projected tonnages and diversion estimates through this study period (FY 2035) are summarized in Table ES-1.

Table ES-1. Projections through Study Period (FY 2035)

Total MSW Generated	197,113 tons
Total Diverted Material	83,976 tons
Diversion	43% ^a

^a Diversion is expected to increase from this percentage with implementation of the enhancement opportunities further described in this plan (for example, curbside recycling, construction and demolition [C&D] commercial disposal restrictions, and new material recovery facility). Percentage increase dependent on how and when programs implemented.

To determine the best approaches to managing waste, it is important to understand the source and the type of waste to be managed. The County retained Cascadia Consulting Group (Cascadia) to conduct a waste composition study to obtain information for use in developing planning estimates. These estimates are used in various sections of this Plan. The 2016 Waste Characterization Study provided an estimate of the composition and quantities of solid waste material disposed at the Kekaha Landfill.

Based on the 2016 study (as summarized on Figure ES-2), 23.7 percent of the County's waste stream is made up of Inerts and Other Construction and Demolition (Other C&D), which is the largest portion of the disposed waste stream. Paper (18.4 percent), Other Organics (18.0 percent), Plastic (11.5 percent), and Food (10.3 percent) also make up significant portions of the overall disposed waste stream.⁸

⁸ Cascadia. 2017. Kaua'i County Waste Characterization Study Report 2017. May.

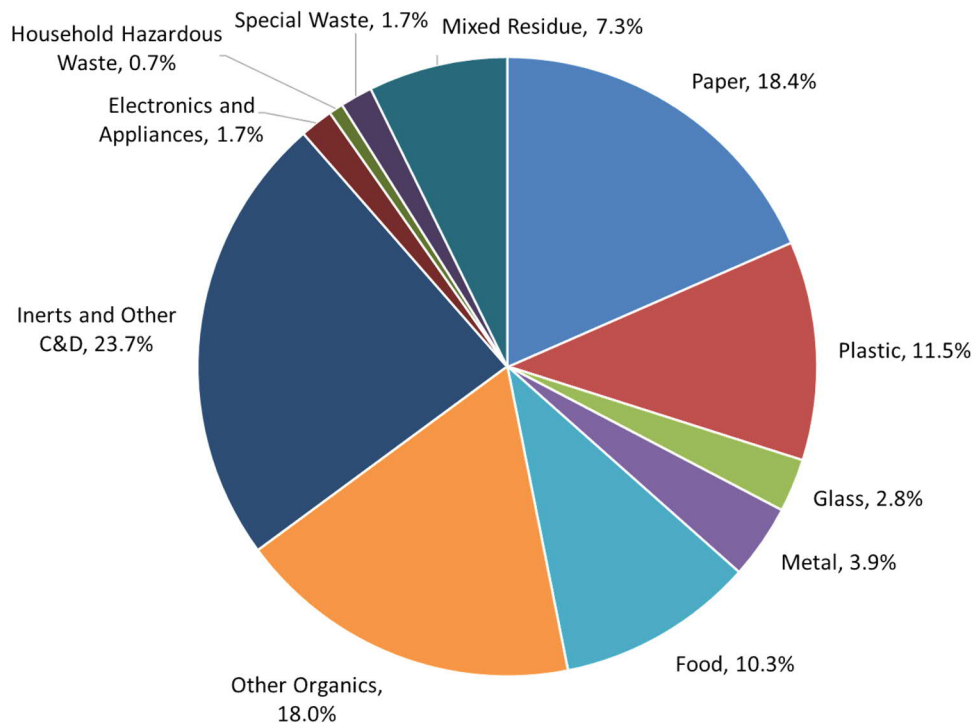


Figure ES-2. Disposed Composition by Material Class, Overall Kaua'i County-wide Waste Composition (FY 2016)

Financial Stability

Approximately 60 percent of the County of Kaua'i Solid Waste Division (Solid Waste Division) operating and maintenance expenses are paid for by assistance from the County (General Fund). Solid waste tipping fees and other revenues pay for the remaining 40 percent of operating and maintenance expenses. Capital expenses are both debt-financed and paid for through the General Fund. One of the objectives of the ISWMP is to provide an estimate of the true cost of providing services without any incoming revenue from the General Fund. The financial model was used to estimate the cost of service for long-run implementation of the ISWMP.

Although solid waste operating and maintenance expenses are currently subsidized through the General Fund, the County has the authority and systems in place to increase commercial tipping fees and residential PAYT program fees to fully fund its solid waste programs in the future if desired.

Key Components of the Future System

The County has several existing programs and policies that contribute to a relatively stable diversion rate of 43 percent (based on the baseline FY 2019 diversion rate). Many of these programs have been in place for over a decade, while some were programs and policies that were implemented as a result of the last Plan, which was adopted in 2010. Important program and policy changes have been implemented since the adoption of the last Plan. Unfortunately, funding was an issue and several of the recommended actions were not implemented, including a centralized compost facility, a material recovery facility (MRF), curbside green waste and recycling, a waste-to-energy (WTE) program, HHW program expansion, and market development grants.

Considering the historic funding hurdles, this Plan used the following approach in developing and selecting the enhancement opportunities and strategies that were included in the Plan and summarized in Table ES-2:

- Focus on problematic materials and materials found in excess in the disposed and landfill waste streams (as identified in the 2016 Waste Characterization Study).
- Build off the success of existing programs and working groups.
- Expand or modify existing programs to gain additional success.
- Consider new enhancement opportunities that would be needed to take diversion to the next level and further support more sustainable strategies.
- Prioritize enhancements that are feasible for the County based on current or slightly increased staffing levels.
- Recommend evaluation of implementing major program enhancements in future years to assess their feasibility, including cost-effectiveness and siting (for example, residential curbside collection of recyclables and a new MRF), and identify funding sources.

The resulting list of enhancement opportunities and strategies includes primarily implementable options, some of which are intended to serve as initial steps that could lead to more progressive options.

Table ES-2. Planned County Programs

Item	Enhancement Opportunity/Strategy	Planning Horizon	Implementation Difficulty	Year	1	2	3	4	5	6-10
				FY	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Annual, FY 2026-30
3. Source Reduction										
1	Build off and expand policies for plastic and polystyrene reduction and compostable use. ^a	Short-term	Low							
2	Advocate for EPR for potential candidate materials such as fluorescent tubes, paper, packaging, mattresses, and paint. ^a	Medium-term	Easy to Advocate Difficult to Implement							
3	Offer Grant-in-Aid to support "Food Waste to Animal Feed" projects.	Short-term	Low				\$15,000	\$15,000	\$15,000	
4	Recognize and promote the Lodging Industry's source reduction efforts. ^a	Short-term	Low							
5	Support State Plastics Source Reduction Working Group findings related to the use of reusable containers at restaurants. ^a	Medium-term	Medium							
6	Consider a fee increase for PAYT program. ^{a,b}	Long-term	High							
4. Recycling and Bioconversion										
7	Build upon previous curbside recycling collection studies and new MRF feasibility and siting study. ^b	Medium-term	High				\$250,000			
8	Implement curbside recycling and material recovery facility (assuming MRF construction and curbside programs determined to be feasible and funding is secured.)	Long-term	High						TBD	
9	Support DBC (HI5) deposit increase. ^a	Short-term	Easy to Support Difficult to Implement							
10	Evaluate and expand additional commercial disposal restrictions (such as C&D) and identify recycling opportunities for businesses. ^a	Medium-term	High							
11	Support expansion of tiered composting regulations to encourage smaller composting operations. ^a	Short-term	Medium							
12	Design and implement compost demonstration project, then evaluate food waste composting program. ^b	Medium-term	High					\$60,000	\$10,000	
13	Support permit modifications for food waste composting at private facilities and/or issue RFP(s).	Medium-term	Medium				\$25,000	\$25,000		
14	Offer Grant-in-Aid funding for priority recycling and organics projects on-island.	Short-term	Low				\$20,000	\$20,000	\$20,000	\$20,000
15	Issue RFP for pallet processing facility to chip/mulch/market pallets.	Medium-term	Medium					\$15,000	\$15,000	
16	Allocate appropriate resources to hire new staff (1 full-time employee [FTE]) for recycling programs.	Short-term	Medium				\$110,000	\$110,000	\$110,000	\$110,000
17	Co-locate new recycling drop-off sites and HI5 Certified Redemption Centers with existing solid waste facilities when possible. ^a	Short-term	Medium							
5. Special Wastes										
18	Increase public education regarding proper disposal of acetylene tanks. ^a	Short-term	Low							
19	Expand disposal ban to include select C&D materials. ^a	Medium-term	Medium							
20	Prepare County videos to address public education needs for special wastes.	Short-term	Low				Costs included in Section 7			
21	Evaluate opportunities for sewage sludge diversion and act on opportunities if cost-effective and overall beneficial. ^b	Medium-term	High					\$80,000		
22	Implement collection of used cooking oil at Kaua'i Resource Center.	Medium-term	Medium				\$20,000	\$20,000	\$20,000	\$20,000

Table ES-2. Planned County Programs

Item	Enhancement Opportunity/Strategy	Planning Horizon	Implementation Difficulty	Year	1	2	3	4	5	6-10
				FY	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Annual, FY 2026-30
6. Household Hazardous Waste and Electronic Waste										
23	Evaluate a Drop-and-Swap program at the KRC. ^a	Short-term	Medium							
24	Network with automotive stores and repair shops to see how they may be able to directly service the public for managing of automotive fluids/materials. ^a	Short-term	Low							
25	Advocate for EPR for select materials (for example, fluorescent tubes). ^a	Medium-term	Easy to Advocate Difficult to Implement							
26	Assess feasibility of accepting eWaste at RTSs after completion of RTS improvement projects. ^b	Long-term	Medium						\$50,000	
27	Evaluate residential disposal bans on eWaste if it is feasible to accept eWaste at RTSs (see Item #10 for additional bans). ^a	Long-term	Medium to Evaluate Difficult to Implement							See Item #10
7. Public Education										
28	Promote the true cost of solid waste programs. ^a	Short-term	Low							
29	Enhance the school Reduce, Reuse, and Recycle (3R) program. ^a	Medium-term	Low							
30	Evaluate a food waste comprehensive program and use compost and food waste survey results to help guide needs. ^a	Medium-term	Medium							
31	Update the County website with an increased number of image-based posters and videos.	Short-term	Low				\$10,000	\$10,000	\$10,000	
32	Promote the State Green Recognition Program. ^a	Short-term	Low							
33	Develop and Support a Recycling Block Leader Program. ^a	Short-term	Medium							
34	Allocate appropriate resources to hire new staff (1 FTE) public outreach and education (\$20,000/year for expenses and \$110,000/year for resources).	Short-term	Medium				\$130,000	\$130,000	\$130,000	\$130,000
35	Use a business survey process to advertise education needs and focus areas and then target businesses that may require technical assistance. ^a	Short-term	Medium							
8. Materials Marketing										
36	Explore potential for plastic processing innovations. ^b	Medium-term	High				\$60,000			
37	Advance the County recycled product purchasing policy. ^a	Medium-term	Medium							
38	Evaluate on-island recycling opportunities and issue RFPs for select materials, such as dry materials and organics. ^{a,b}	Medium-term	Medium					\$25,000	\$25,000	
39	Promote state compost standards. ^a	Short-term	Medium							
40	Improve County use of recycled glass, organics, and other recycled products. ^a	Medium-term	Medium							
41	Promote enhanced state and federal market development efforts and funding. ^a	Short-term	Low							
9. Facilities										
42	Assess closing landfill and RTSs on Sundays to improve efficiency. ^b	Short-term	Easy to Evaluate Moderate to Difficult to Implement				\$15,000			
43	Continue and enhance RTS staff training program to improve compliance with drop-off restrictions (for example, commercial use, pressurized tanks, and used-oil collection). ^a	Medium-term	Medium							
44	Propose an increase to commercial RTS tipping coupon fees. ^a	Short-term	Medium							

Table ES-2. Planned County Programs

Item	Enhancement Opportunity/Strategy	Planning Horizon	Implementation Difficulty	Year	1	2	3	4	5	6-10
				FY	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Annual, FY 2026-30
45	Improve emergency operating procedures at the Kekaha Landfill. ^a	Short-term	Low							
46	Allocate appropriate resources to hire new staff for landfill operations (County to determine best way to staff and phase in over a few years).	Short-term	Medium				\$120,000	\$120,000	\$230,000	\$290,000
47	Proceed with permitting and design for vertical expansion of Kekaha.	Short-term	Low			\$335,000				
10. Evaluation of Long-Term Disposal Strategies										
48	Conduct a siting study for a new landfill.	Short-term	Medium				\$500,000			
49	WTE/alternative technologies feasibility study.	Short-term	Medium		\$300,000					
50	Continue assessing disposal options and capacity.	Short- to long-term	Medium							

^a Assume no cost for program but requires some staff time. Factor into the additional resources.

^b If implemented, Kaua'i County costs would change (increase or decrease) and those potential cost changes are not shown in this table (see the relevant section for additional information).

Contents

Acknowledgments	A-1
Executive Summary	ES-1
Acronyms and Abbreviations	viii
1. Overview of Existing Solid Waste Management System	1-1
1.1 Background.....	1-1
1.2 Integrated Solid Waste Management Plan Update Process.....	1-1
1.3 Introduction to the Solid Waste Management System	1-3
1.4 Solid Waste Collection.....	1-4
1.4.1 Residential Solid Waste Collection	1-4
1.4.2 Commercial Solid Waste Collection.....	1-5
1.5 Source Reduction.....	1-6
1.5.1 In-house Efforts.....	1-6
1.5.2 Residential and Commercial Efforts.....	1-7
1.6 Recycling and Bioconversion	1-11
1.6.1 Recycling.....	1-11
1.6.2 Bioconversion of Green Waste.....	1-15
1.7 Special Waste Management	1-16
1.7.1 Asbestos-containing Materials.....	1-16
1.7.2 Agricultural Wastes	1-17
1.7.3 Infectious Medical Wastes.....	1-17
1.7.4 Abandoned and Derelict Vehicles.....	1-18
1.7.5 Sewage Sludge.....	1-18
1.7.6 White Goods	1-19
1.7.7 Scrap Tires	1-19
1.7.8 Used Motor Oil.....	1-19
1.7.9 Lead Acid and Household Batteries.....	1-20
1.7.10 Pressurized Tanks	1-20
1.7.11 Used Cooking Oil.....	1-21
1.7.12 Construction and Demolition Materials	1-21
1.7.13 Petroleum-Contaminated Soil.....	1-21
1.7.14 Dead Animals	1-21
1.7.15 Municipal Waste Combustion Ash.....	1-22
1.8 Household Hazardous Waste and Electronic Waste.....	1-22
1.8.1 Household Hazardous Waste.....	1-22
1.8.2 Electronic Waste	1-23
1.9 Public Education.....	1-23
1.9.1 County Website.....	1-24
1.9.2 Direct Engagement	1-24
1.9.3 Radio	1-24
1.9.4 Print Media	1-24
1.9.5 Brochures, Signs, and Other Printed Material	1-24
1.9.6 Questionnaires.....	1-25
1.9.7 Workshops, Meetings, and Public Events.....	1-25
1.9.8 Visitor Industry Participation	1-25
1.9.9 School Participation	1-25

	1.9.10 County Employees and Programs	1-25
1.10	Refuse Transfer Stations	1-26
1.11	Kekaha Municipal Solid Waste Landfill.....	1-27
1.12	Business, Non-profit, and Government Agency Use of Residential Programs.....	1-29
2.	Solid Waste Generation and Composition.....	2-1
2.1	Planning Period	2-1
2.2	Population Projections	2-1
2.3	Current Generation Quantities	2-2
2.4	Waste Diversion Summary	2-2
2.5	Future Generation Quantities.....	2-3
2.6	Waste Stream Characterization	2-4
	2.6.1 Methodology	2-4
	2.6.2 Solid Waste Composition	2-5
3.	Source Reduction and Reuse.....	3-1
3.1	Purpose.....	3-1
3.2	Background.....	3-1
	3.2.1 Legislative.....	3-1
	3.2.2 Current Source Reduction and Reuse Activities	3-2
3.3	Enhancement Opportunities.....	3-2
	3.3.1 Build Off and Expand Policies for Plastic and Polystyrene Reduction and Compostable Use	3-2
	3.3.2 Advocate for Extended Producer Responsibility for Potential Candidate Materials.....	3-2
	3.3.3 Offer Grant-in-Aid Funding to Support Food Waste to Animal Feed Projects....	3-3
	3.3.4 Recognize and Promote the Lodging Industry's Source Reduction Efforts	3-3
	3.3.5 Support State Plastics Source Reduction Working Group Findings Related to Use of Reusable Containers at Restaurants	3-3
	3.3.6 Consider Fee Increase for Pay As You Throw Program.....	3-4
4.	Recycling and Bioconversion	4-1
4.1	Purpose.....	4-1
4.2	Background.....	4-1
	4.2.1 Legislative.....	4-1
4.3	Material Management System Options	4-2
4.4	Enhancement Opportunities.....	4-3
	4.4.1 Build upon Previous Curbside Recycling Collection Studies and New Material Recovery Facility Feasibility and Siting Study	4-3
	4.4.2 Support Deposit Beverage Container (HI5) Deposit Increase.....	4-5
	4.4.3 Evaluate and Expand Additional Commercial Disposal Restrictions (such as C&D) and Identify Recycling Opportunities for Businesses	4-6
	4.4.4 Support Expansion of Tiered Composting Regulations to Encourage Smaller Composting Operations.....	4-8
	4.4.5 Design and Implement Compost Demonstration Project, Then Evaluate Food Waste Composting Program	4-8
	4.4.6 Support Permit Modifications for Food Waste Composting at Private Facilities and/or Issue RFP(s).....	4-9
	4.4.7 Offer Grant-in-Aid Funding for Recycling and Organics Projects	4-9
	4.4.8 Issue RFP for Pallet Processing Facility to Process Pallets	4-9
	4.4.9 Allocate Appropriate Resources to Hire New Staff for Recycling Programs.....	4-9

4.4.10	Co-Locate New Recycling Drop-off Sites and HI5 Certified Redemption Centers with Existing Solid Waste Facilities When Possible.....	4-10
5.	Special Wastes.....	5-1
5.1	Purpose.....	5-1
5.2	Background.....	5-1
5.2.1	Legislative.....	5-1
5.3	Enhancement Opportunities.....	5-1
5.3.1	Increase Public Education Regarding Proper Disposal of Acetylene Tanks.....	5-1
5.3.2	Expand Disposal Bans to Include Select C&D Materials.....	5-2
5.3.3	Prepare County Videos to Address Public Educations Needs for Special Wastes.....	5-2
5.3.4	Evaluate Opportunities for Sewage Sludge Diversion and Act on Opportunities if Cost-Effective and Overall Beneficial.....	5-2
5.3.5	Implement Collection of Used Cooking Oil at the KRC.....	5-3
6.	Household Hazardous Waste and Electronic Waste.....	6-1
6.1	Purpose.....	6-1
6.2	Background.....	6-1
6.2.1	Legislative.....	6-1
6.2.2	Enhancement Opportunities.....	6-2
7.	Public Education.....	7-1
7.1	Purpose.....	7-1
7.2	Background.....	7-1
7.2.1	Legislative.....	7-1
7.2.2	Current Public Education Activities.....	7-1
7.3	Enhancement Opportunities.....	7-1
7.3.1	Promote True Cost of Solid Waste Programs.....	7-1
7.3.2	Enhance the School Reduce, Reuse, and Recycle (3R) Program.....	7-2
7.3.3	Evaluate a Food Waste Comprehensive Program and Use Compost and Food Waste Survey to Help Guide Needs.....	7-2
7.3.4	Update County Website with an Increased Number of Image-Based Posters and Videos.....	7-2
7.3.5	Promote State Green Recognition Program.....	7-2
7.3.6	Develop and Support a Recycling Block Leader Program.....	7-3
7.3.7	Allocate Appropriate Resources to Hire New Staff for Public Outreach and Education.....	7-3
7.3.8	Use Business Survey Process to Advertise Education Needs and Focus Areas and then Target Businesses that may Require Technical Assistance.....	7-3
8.	Materials Marketing and Procurement.....	8-1
8.1	Purpose.....	8-1
8.2	Background.....	8-1
8.2.1	Legislative.....	8-1
8.2.2	Current Market Challenges.....	8-1
8.3	Existing Programs and Markets.....	8-2
8.3.1	Paper.....	8-2
8.3.2	Glass.....	8-3
8.3.3	Metals.....	8-4
8.3.4	Plastics.....	8-5
8.3.5	Green Waste.....	8-6

8.3.6	Used Oil.....	8-7
8.3.7	Tires	8-7
8.3.8	Electronics	8-8
8.3.9	Other Materials	8-9
8.4	Enhancement Opportunities.....	8-9
8.4.1	Explore Potential for Plastic Processing Innovations.....	8-9
8.4.2	Advance County Recycled Product Purchasing Policy.....	8-10
8.4.3	Evaluate On-island Recycling Opportunities and Issue RFPs for Select Materials	8-10
8.4.4	Promote State Compost Standards	8-11
8.4.5	Improve County Use of Recycled Glass, Organics and Other Recycled Products	8-11
8.4.6	Promote Enhanced State and Federal Market Development Efforts and Funding	8-11
9.	Refuse Transfer Stations and Landfills.....	9-1
9.1	Purpose.....	9-1
9.2	Legislative Background.....	9-1
9.3	Refuse Transfer Stations	9-1
9.3.1	Existing Refuse Transfer Stations.....	9-1
9.3.2	Enhancement Opportunities	9-2
9.3.3	Future Needs	9-2
9.4	Kekaha Municipal Solid Waste Landfill.....	9-3
9.4.1	Existing Kekaha Landfill	9-3
9.4.2	Emergency Operating Procedures.....	9-3
9.4.3	Kekaha Landfill Remaining Existing Capacity	9-4
9.4.4	Vertical Expansion to Increase Kekaha Landfill Capacity	9-4
9.5	Facility Siting Process.....	9-5
9.5.1	Purpose	9-5
9.5.2	Principles	9-5
9.5.3	Site Selection Process	9-5
9.5.4	Stage 1 – Establish Siting Task Force	9-6
9.5.5	Stage 2 – Identify Excluded Sites and Develop County-specific Siting Criteria ..	9-7
9.5.6	Stage 3 – Define Ranking Parameters and Rank Available Sites	9-9
9.5.7	Stage 4 – Selecting Preferred Sites.....	9-10
9.5.8	Mediation Process	9-11
9.5.9	Recent Siting Efforts	9-11
9.6	Enterprise Zones	9-12
10.	Evaluation of Long-Term Disposal Options (30-year Time Horizon)	10-1
10.1	Background.....	10-1
10.2	Subtitle D Landfill.....	10-1
10.2.1	Develop Proposed Ma'alo Road Landfill	10-2
10.2.2	Develop New Landfill on Kaua'i at Location Other Than Ma'alo Road	10-3
10.2.3	Mine Closed Portion of Kekaha Landfill	10-4
10.3	Conventional Waste-To-Energy	10-5
10.4	Alternative Technology Assessment	10-6
10.4.1	Background.....	10-6
10.4.2	Anaerobic Digestion, Including Co-Digestion	10-6
10.4.3	Pyrolysis and Gasification	10-7

10.4.4	MSW Aerobic Composting	10-8
10.4.5	Mechanical-Biological Treatment.....	10-9
10.4.6	Chemical Recycling.....	10-10
10.5	Waste Export.....	10-11
10.5.1	Waste Export to H-POWER or Hawai'i County Landfill	10-11
10.5.2	Waste Export to Mega Landfills on West Coast of Mainland U.S.....	10-12
10.6	Cost Summary and Long-Term Disposal Strategy.....	10-13
10.6.1	Cost Summary	10-13
10.6.2	Long-Term Disposal Strategy.....	10-14
11.	Energy Balance	11-1
11.1	Purpose.....	11-1
11.2	Background.....	11-1
11.3	Energy Balance Estimates.....	11-1
11.3.1	Scenario 1: Existing System, FY 2019.....	11-2
11.3.2	Scenario 2: Increased Diversion through Regulation, Infrastructure, and Programs, FY 2019.....	11-4
11.4	Summary and Conclusions	11-6
12.	ISWMP Cost Analysis	12-1
12.1	Purpose.....	12-1
12.2	Background.....	12-1
12.3	Key Assumptions and Methodology	12-1
12.3.1	Key Assumptions	12-1
12.3.2	Methodology	12-1
12.4	Projections of Customer Account and Solid Waste Managed	12-2
12.4.1	Solid Waste Collection Accounts	12-2
12.4.2	Solid Waste Quantities	12-4
12.5	Operating Revenues.....	12-4
12.5.1	Existing Rates.....	12-4
12.5.2	Revenues from Rates and Fees	12-6
12.6	Operating Expenses	12-9
12.6.1	FY 2020-2029 Projected Expenses	12-9
12.6.2	Residential Collection Expense	12-11
12.6.3	Commercial Collection Expenses	12-11
12.6.4	RTS Expenses.....	12-11
12.6.5	Landfill Expenses.....	12-11
12.6.6	Recycling Expenses.....	12-11
12.6.7	Green Waste Expense	12-12
12.7	Capital Expenditures and Debt Service, FY 2021 – 2030	12-12
12.8	Projected Operating Statement With Existing Rates and Fees	12-13
12.9	Cost-of-Service Analysis.....	12-15
12.9.1	FY 2021 Cost-of-Service Results	12-15
12.9.2	Projected Future Cost-of-Service Unit Costs and Rates.....	12-16
13.	Recommended Action Plan	13-1
13.1	Background.....	13-1
13.2	Implementation Plan.....	13-1

Tables

ES-1	Projections through Study Period (FY 2035).....	ES-6
ES-2	Planned County Programs	ES-9
1-1	Integrated Solid Waste Management Plan Update Schedule	1-2
1-2	Residential Refuse Collection Assessment.....	1-5
1-3	Commercial and Transient Vacation Rental Refuse Collection Assessment.....	1-6
1-4	Kaua'i Recycles Drop Bin Locations and Tons Collected	1-11
1-5	Kaua'i Recycles Drop Bin Materials (in tons)	1-12
1-6	Comparison of Prior Handling Fees and New Handling Fees Per Container	1-14
1-7	Kaua'i RTSs and FY 2019 Tonnage	1-26
1-8	RTS Non-residential Coupon Fees.....	1-26
1-9	County of Kaua'i Landfill Disposed Waste Streams FY 2019	1-28
1-10	Commercial Tipping Fees	1-28
1-11	Commercial Tipping Fees with Inoperable Vehicle Scale.....	1-29
2-1	De Facto Population Projections for Kaua'i County.....	2-1
2-2	Waste Generation, FY 2019.....	2-2
2-3	Quantities Diverted from the Kekaha Landfill (in tons), FY 2019.....	2-3
2-4	Projected MSW and Diverted Material Generation.....	2-3
2-5	Waste Composition Sample Distribution by Substream	2-4
2-6	Waste Composition Study Solid Waste Totals	2-5
2-7	Detailed Disposed Waste Composition, Overall Kaua'i County-wide (FY 2016).....	2-6
2-8	Disposed Waste Composition by Material Class, Residential, Commercial, and Total (FY 2016).....	2-8
2-9	Disposed Waste Composition, Private Commercial Waste (FY 2016).....	2-9
2-10	Disposed Waste Composition, County RTS (Residential) Waste (FY 2016).....	2-11
2-11	Generation, Diversion, and Disposal by Material (FY 2019)	2-13
3-1	Potential Modified Residential Refuse Collection Assessment Options	3-4
4-1	Residential Material Management System Options.....	4-3
4-2	Materials for Consideration for Expanded Commercial Recycling Landfill Bans.....	4-7
8-1	Paper Market Overview.....	8-3
8-2	Glass Market Overview	8-4
8-3	Metal Market Overview.....	8-5
8-4	Plastic Market Overview.....	8-6
8-5	Green Waste Market Overview.....	8-6
8-6	Used-Oil Market Overview.....	8-7
8-7	Used Tires Market Overview	8-8
8-8	Used Electronics Market Overview	8-9
9-1	One-Way Distances from Existing RTSs to the Kekaha Landfill (miles).....	9-2
9-2	Capacity Analysis for RTSs.....	9-3
9-3	Designated Enterprise Zones	9-12
10-1	Advantages and Disadvantages for Development of Proposed Ma'alo Road Landfill	10-3
10-2	Advantages and Disadvantages for Development of New Landfill on Kaua'i at Location Other Than Ma'alo Road.....	10-4
10-3	Advantages and Disadvantages for a WTE Facility.....	10-6
10-4	Advantages and Disadvantages for Waste Export to H-POWER and/or West Hawai'i Sanitary Landfill	10-12
10-5	Advantages and Disadvantages for Waste Export to West Coast Mainland Landfills.....	10-13
10-6	Estimated Cost of Long-Term Disposal Options	10-13
11-1	WARM Model Scenario 1 Tons, FY 2019	11-3
11-2	WARM Model Scenario 2 Tons, Increased Diversion.....	11-5
11-3	Summary of Total Energy Use and Ranking for Energy Balance Scenarios, FY 2019	11-6
12-1	Historical and Projected Division Accounts	12-3
12-2	Historical and Projected Waste Quantities Fiscal Years 2019-2030	12-4
12-3	Residential Refuse Collection Assessment.....	12-5
12-4	Commercial and Transient Vacation Rental Refuse Collection Assessment.....	12-5
12-5	RTS Non-residential Coupon Fees.....	12-6

12-6	Commercial Tipping Fees	12-6
12-7	Projected Operating Revenues from Existing Rates and Fees	12-8
12-9	Projected Debt Service Fiscal Years FY 2021-2030	12-12
12-10	Projected Operating Statement with Existing Rates and Fees	12-14
12-11	Allocation of Operations and Maintenance Costs to System Divisions	12-15
12-12	FY 2021 Operating Cost-of-Service by Cost Center.....	12-16
12-13	Projected Cost-of-Service Unit Costs by Cost Center	12-17
13-1	Ongoing County Programs	13-2
13-2	Planned County Programs.....	13-4

Figures

ES-1	County of Kaua'i Solid Waste Management Facilities	ES-2
ES-2	Disposed Composition by Material Class, Overall Kaua'i County-wide Waste Composition (FY 2016)	ES-7
1-1	County of Kaua'i Solid Waste Management Facilities	1-4
2-1	Disposed Composition by Material Class, Overall Kaua'i County-wide Waste Composition (FY 2016)	2-6
2-2	Disposed Residential and Commercial Waste Composition (FY 2016)	2-9
9-1	Siting Strategy Process.....	9-6
9-2	Enterprise Zones	9-13
10-1	Cost Comparison of Long-Term Disposal Options	10-14
12-1	Operating Revenue from Rates and Fees by Source for Mayor's Requested Budget FY 2021	12-7
12-2	Operating Expenditures by Division, Mayor's Budget Request FY 2021	12-11

Appendix

A	Summary of Public Comment and Response	A-1
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Acronyms and Abbreviations

3R	Reduce, Reuse, and Recycle
ACM	asbestos-containing material
ADC	alternative daily cover
ADF	Advance Deposit Fee
ARC	Adult Rehabilitation Center
C&D	construction and demolition
Cascadia	Cascadia Consulting Group
CESQG	conditionally exempt small quantity generator
CFR	Code of Federal Regulations
County	County of Kaua'i
COLA	cost of living allowance
COVID-19	novel coronavirus disease of 2019
CRC	certified redemption center
CRTs	cathode ray tubes
DBC	deposit beverage container
Division	Kaua'i County Solid Waste Division
DMV	Department of Motor Vehicles
ECS	Environmental Control Systems
EPA	Environmental Protection Agency
EPR	Extended Producer Responsibility
eWaste	electronic waste
FAA	Federal Aviation Administration
FTE	full-time employee
FY	fiscal year
GF	general fund
GID	Garden Isle Disposal
GPTAF	Green Purchasing Technical Assistance Funds
HAR	Hawai'i Administrative Rules
HB	House Bill
HDOH	State of Hawai'i Department of Health
HDOT	State of Hawai'i Department of Transportation
HDPE	high-density polyethylene
HHW	household hazardous waste
HI5	Hawai'i Deposit Beverage Container Program
HRS	Hawai'i Revised Statutes

ISWMP	Integrated Solid Waste Management Plan
Kekaha Landfill	Kekaha Municipal Solid Waste Landfill
KIUC	Kaua'i Independent Utility Cooperative
KRC	Kaua'i Resource Center
Landfill	Kekaha Municipal Solid Waste Landfill
LCD	liquid crystal display
MACLS	Mayor's Advisory Committee on Landfill Site Selection
MBT	mechanical-biological treatment
MMBtu	million British Thermal Units
MRF	material recovery facility
MSW	municipal solid waste
n/a	not applicable
NASPO	National Association of State Procurement Officials
NESHAP	National Emission Standards for Hazardous Air Pollutants
OCC	old corrugated cardboard or corrugated cardboard
PAYT	Pay As You Throw
PCCC	Pacific Concrete Cutting and Coring
PET	polyethylene terephthalate
Plan	Integrated Solid Waste Management Plan
Planning Department	Kaua'i County Planning Department
PMRF	Pacific Missile Range Facility, Barking Sands
RCRA	Resource Conservation and Recovery Act
RDF	refuse-derived fuel
RFP	request for proposal
RRCA	Residential Refuse Collection Assessment
RRS	Resource Recovery Solutions, LLC
RTS	refuse transfer station
SWAC	Solid Waste Advisory Committee
TDA	tire-derived aggregate
TDF	tire-derived fuel
UF	user fee
WARM	Waste Reduction Model
WMH	Waste Management Hawai'i
WTE	waste-to-energy

1. Overview of Existing Solid Waste Management System

The County of Kaua'i (County) recognizes the value of a comprehensive waste prevention, recycling, composting, and disposal program. To determine the most effective combined strategy for managing solid waste while protecting human health and the environment and promoting strategies that make the island more sustainable, the County has developed, and periodically updates, an Integrated Solid Waste Management Plan (ISWMP or Plan). The first step in updating the Plan is to gather information on the existing solid waste management system.

1.1 Background

Chapter 342G of the Hawai'i Revised Statutes (HRS) requires each county to develop a Plan to be revised once every 10 years, provided that an interim status report is submitted 5 years after every revised Plan submission. The County has implemented a number of major system improvements since the previous Plan was adopted, including automated refuse collection, a flat fee for refuse service, a pay as you throw (PAYT) program, commercial landfill restrictions, a plastic bag law, and a ban on polystyrene (to be effective in January 2022).

This Plan update provides a strategy for implementing environmentally prudent and economically feasible integrated solid waste management components to enhance or upgrade the County's existing systems. The Plan begins with an overview of Kaua'i's existing solid waste management system (Section 1) and a look at the current and projected waste stream (Section 2). Sections 3 through 7 discuss individual elements of the County's solid waste management system with an emphasis on future enhancement opportunities. A discussion of existing markets for post-consumer materials, methods to increase access to markets, and strategies for promoting procurement of recycled materials is presented in Section 8. Section 9 includes information about refuse transfer stations (RTSs), the Kekaha Landfill, the facility siting process, and enterprise zones. Section 10 provides an evaluation of long-term disposal options and alternative waste disposal technologies. An energy balance, quantifying the energy required to run the current solid waste system and investigating the energy impacts of future system changes, is presented in Section 11. The revenues and expenses required to manage the system are addressed in Section 12, and Section 13 contains an implementation strategy, which identifies ongoing and planned initiatives for the 10-year period leading up to the next iteration of the Plan (fiscal year [FY] 2020 through FY 2029).

Each of these components is described in more detail in this introduction and in the dedicated sections that follow.

It is important to note that information included in the Plan is based on data obtained before the emergence of the 2019 novel coronavirus disease (COVID-19). The full implications of COVID-19 on waste generation and diversion in the County or on the County's budget are not currently known, though some short-term impacts are already apparent. For example, the lodging industry is facing a source reduction backslide as a result of increased COVID-19 cleaning requirements. It is anticipated that there will be significant funding shortfalls and budget impacts in the next several years. The County may choose to revisit these planning estimates and make any necessary adjustments at a later date once better data are available. Information regarding temporary or permanent updates to County programs related to COVID-19 social distancing measures is available on the County's website.

1.2 Integrated Solid Waste Management Plan Update Process

Updating the ISWMP every 10 years requires significant effort on the part of the County to compile information and data that are used to assess the existing solid waste system and develop a feasible plan for the next 10 years and beyond. The process of an ISWMP update typically spans more than a year because of the required careful consideration of stakeholder input throughout the development of the Plan combined with the HRS requirements for specific review periods.

A Solid Waste Advisory Committee (SWAC) was appointed by the Mayor to guide the Plan's direction and assure that it provides a holistic reflection of the priorities of Kaua'i. Five SWAC meetings were held to discuss and solicit feedback on the Plan's content, with multiple drafts issued for stakeholder reviews. Ultimately, the Plan must be approved by the State of Hawai'i Department of Health (HDOH) and then adopted by the County.

The following members (listed alphabetically by last name) comprised the SWAC, which provided important input to the development of this Plan:

- Keola Aki, County of Kaua'i, Acting Solid Waste Development Coordinator.
- Eli Brainerd, Pacific Concrete Cutting and Coring.
- Jesse Brown-Clay, Zero Waste Kaua'i.
- George Costa, Hawai'i Lodging and Tourism Association.
- Fred Cowell, Kaua'i Coffee Company.
- Allen Evans, Resource Recovery Solutions (Puhi Metals).
- Allison Fraley, County of Kaua'i, Acting Solid Waste Chief.
- Howard Greene, Gay and Robinson.
- Scott Kouchi, Garden Isle Disposal (GID).
- Conrad Murashige, Shioi Construction.
- Lane Otsu, HDOH Solid Waste Branch.
- Brad Rockwell, Power Supply Manager, Kaua'i Independent Utility Cooperative (KIUC).
- Keith Suga, Pacific Concrete Cutting and Coring.
- Ben Sullivan, County of Kaua'i, Energy and Sustainability Coordinator.

Five SWAC meetings were held during Plan development. These meeting were designed to share historic and current information about the County's solid waste management system, identify system needs and opportunities, and then collect feedback from the diverse representatives on the SWAC to progressively develop and refine enhancement opportunities and strategies that are then aligned over the next 10 years to develop the implementation plan.

Following the issuance of the Public Review Draft (Draft 4), public feedback was collected through written comments and through oral comments during the Public Hearing. These comments and a description of how they were factored into the final Plan are summarized in Appendix A.

The County staff were instrumental in collecting and sharing information and data, developing enhancement opportunities/strategies, coordinating meetings with the Mayor and Plan development teams, and reviewing drafts.

Table 1-1 presents the key milestones and schedule for the update of this Plan.

Table 1-1. Integrated Solid Waste Management Plan Update Schedule

Milestone	Timeframe
County and Consultant Kick-Off	July 2019
Data Gathering and Initial Framing	Began July 2019
SWAC Formation	September 2019
SWAC Meeting #1: Draft Outline and Approach	October 2019
SWAC Meeting #2: Existing Conditions	December 2019
SWAC Meeting #3: Option Definition and Discussion	January 2020
Meeting with the Mayor: Proposed Strategies	June 2020
SWAC Meeting #4: Draft ISWMP Strategies	June 2020
County Review of ISWMP Draft 1	Late June to Early July 2020
SWAC Review of ISWMP Draft 2	July to November 2020

Table 1-1. Integrated Solid Waste Management Plan Update Schedule

Milestone	Timeframe
SWAC Meeting #5: Draft ISWMP Discussion	November 2020
Meeting with the Mayor/Administration	September 2020
HDOH Review of ISWMP Draft 3	December 2020
Meeting with the Mayor/Administration	May 2021
Public Review of ISWMP Draft 4	May 19, 2021 – July 19, 2021
Administrative Review of ISWMP Draft 4	May 2021
Public Hearing	June 2021
Meeting with the Mayor/Administration	September 2021
Final ISWMP for County Adoption	November 2021

1.3 Introduction to the Solid Waste Management System

This section provides an overview of the County's existing solid waste management system, which includes the following main components:

- Solid waste collection.
- Source reduction.
- Recycling and bioconversion.
- Special waste management.
- Household hazardous waste (HHW) and electronic waste (eWaste) management.
- Public education.
- Kaua'i Resource Center (KRC).
- RTSs.
- Kekaha Landfill.

The County oversees numerous programs and policies that allow the solid waste management system to function, many of which are interconnected and reliant on each other. An overview of these programs and policies is presented in the remaining sections of Section 1, with a summary table (Table 13-1) included in Section 13.

The main facilities that offer solid waste management services on Kaua'i are shown on Figure 1-1.

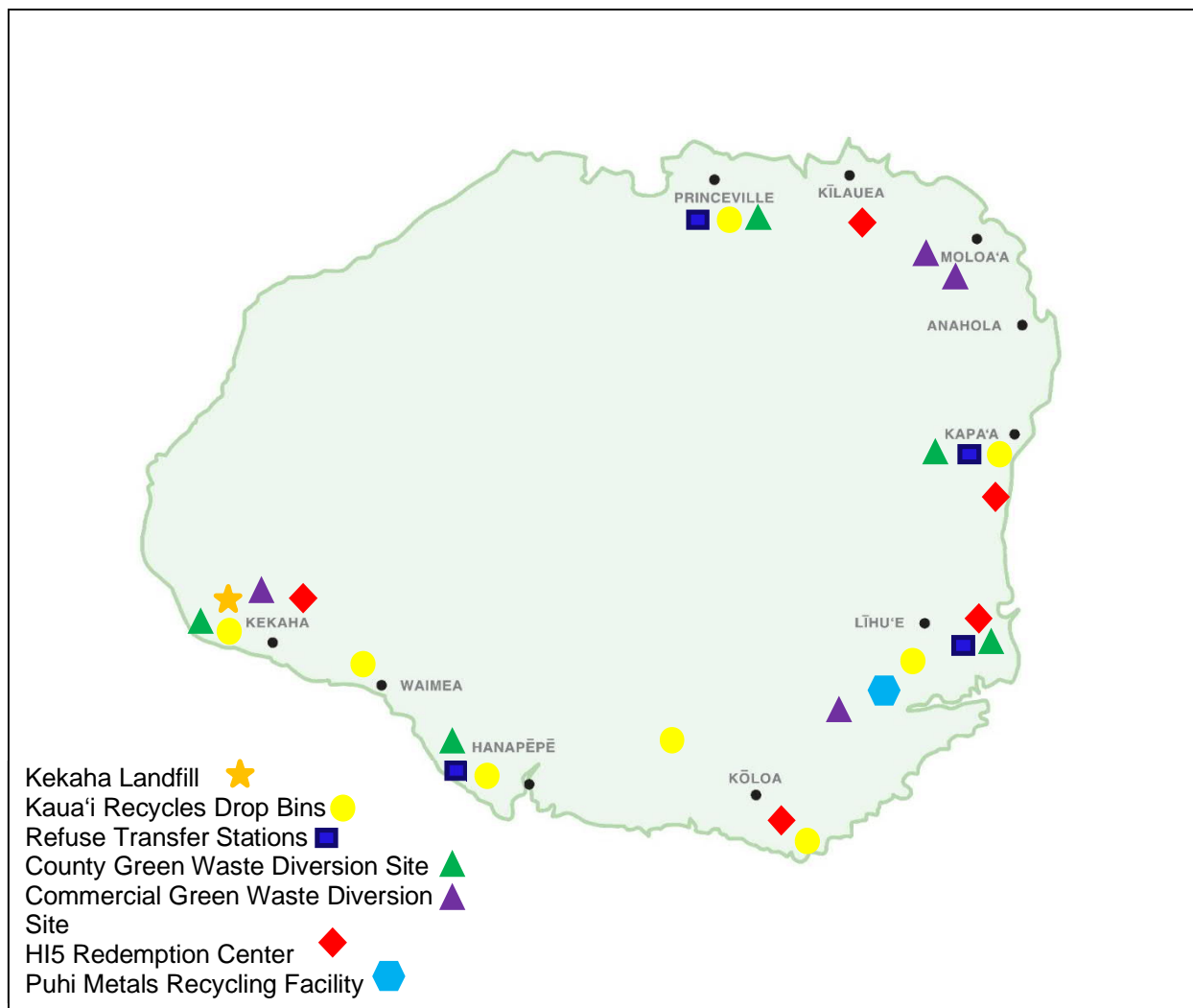


Figure 1-1. County of Kaua'i Solid Waste Management Facilities

1.4 Solid Waste Collection

1.4.1 Residential Solid Waste Collection

The County is responsible for weekly curbside collection of municipal solid waste (MSW) from all residences in the County, including single-family and multi-unit dwellings (a total of 22,447 households in FY 2019).⁹ In July 2015, all Kaua'i residents transitioned to automated refuse collection, which is more efficient and less costly than the previous manual refuse collection system. Refuse is collected 5 days per week, including on holidays, and each side-loader refuse collection truck is staffed by one driver. A modified manual refuse collection crew services a small number of customers not accessible by automated collection trucks. The crew uses a small rear-loader truck fitted with a cart tipper and is staffed by three solid waste workers (a driver plus two additional personnel to position carts).¹⁰

Kaua'i County's Residential Refuse Collection Assessment (RRCA) is a PAYT program that went into effect in July 2015. Residents pay a variable rate for refuse collection, which is assessed via their property tax bill (taxpayers who pay their taxes through their mortgages will not see these fees more than

⁹ Information provided by County of Kaua'i staff. March 21, 2020.

¹⁰ County of Kaua'i, Division of Solid Waste Management. 2018. SW FY 2018 Final Report to the Mayor.

once per year).¹¹ A variable rate service structure provides an economic incentive for reducing trash and increasing waste diversion, recycling, and bioconversion. Table 1-2 shows the County refuse collection fees according to County Ordinance 21-9.1(b).

Table 1-2. Residential Refuse Collection Assessment

Size or Number of Carts	Monthly Fee for Weekly Collection
Base Monthly Assessment per Benefited Property ^{a, b}	\$6.00
Curbside Refuse Collection: one 64-gallon cart	\$4.00
Curbside Refuse Collection: one 96-gallon cart	\$12.00
Assessment for each additional 64-gallon cart	\$10.00
Assessment for each additional 96-gallon cart	\$18.00

^a The Base Assessment covers the use of the RTSs and is charged regardless of whether the dwelling unit is occupied or the resident opts out of collection.

^b Per County Ordinance 21-1.3, "Benefited property" means real property on which there is a dwelling unit or units. Multiple units on a single piece of property shall each be considered to be a separate benefited property.

Note that the base fee is added to the collection fee to determine the total monthly fee for service. For example, the total monthly fee for a 64-gallon cart is \$10 and the total monthly fee for a 96-gallon cart is \$18. The County collects MSW once per week from residential households and notifies each resident of the regular collection day for their area upon collection service enrollment.¹² Residents can also use the County's Refuse Collection Day Lookup webpage to determine their refuse pickup day based on street name.¹³ Carts are owned by the County and available to residents in 64-gallon and 96-gallon sizes. Residents can use the application form available from Solid Waste Division administrative staff or the County's RRCA webpage to start, change, reduce, or cancel curbside collection.¹⁴ The County does not collect recyclables, green waste, or bulky items (that is, sofas, chairs, auto parts, tires, white goods, and other items with a combined volume of more than 1 cubic yard) as part of its regular refuse collection service.

Most County collection vehicles unload at the County RTSs, where the refuse is compacted into open-top transfer trailers and taken to the Kekaha Landfill, located on the western side of the island. In the Kekaha area, County collection vehicles go directly to the landfill to unload.

1.4.2 Commercial Solid Waste Collection

In FY 2019, the County collected refuse from approximately 269 commercial and transient vacation rental refuse collection customers who had opted in for service.¹⁵ Commercial refuse is collected in the same manner as residential collection – with side-loader refuse collection trucks, each staffed by one driver. Commercial accounts are charged a collection fee based on the number containers collected weekly, as shown in Table 1-3. Commercial collection fees are based on actual cost of service and do not include any County subsidy.

¹¹ County of Kaua'i. 2020. Residential Refuse Collection Assessment. <https://www.kauai.gov/RRCA>.

¹² Refuse is collected from each residence on the same day every week unless there is a routing change.

¹³ County of Kaua'i. n.d. Refuse Collection Day Lookup. <http://www.kauaigovonline.org/cokforms/RefuseDayChanges.aspx>.

¹⁴ County of Kaua'i. 2019. RRCA PAYT Application Form. <https://www.kauai.gov/LinkClick.aspx?fileticket=8A6q4XmMxPs%3d&tabid=448&portalid=0&mid=1069>.

¹⁵ Information provided by County of Kaua'i staff. March 21, 2020.

Table 1-3. Commercial and Transient Vacation Rental Refuse Collection Assessment

Size or Number of Carts	Monthly Fee for Weekly Collection
Automated Collection: one 64-gallon cart	\$64.00
Automated Collection: one 96-gallon cart	\$84.00
Automated Collection: each additional 64-gallon cart	\$64.00
Automated Collection: each additional 96-gallon cart	\$84.00

Commercial businesses that do not subscribe to the County's collection service contract with private haulers or self-haul their refuse to an RTS or the landfill. Private haulers are not licensed by the County or the State. Currently, there are a handful of private haulers providing commercial refuse collection in the County.

1.5 Source Reduction

Per the Kaua'i County Code, Chapter 21, Integrated Solid Waste Management, source reduction means the design, manufacture, and use of materials to do the following:

- 1) Minimize the quantity or toxicity, or both, of the waste produced.
- 2) Reduce the creation of waste either by redesigning products or by otherwise changing societal patterns of consumption, use, or waste generation.

The County's existing source reduction efforts focus on providing public education and awareness of existing programs, resources, tools, and regulatory mechanisms that promote source reduction and encourage residents and businesses to prevent waste at the source. Source reduction activities are often difficult to track because they involve prevention of waste before it enters the waste stream. Reuse is considered source reduction because it prevents generation of waste at the source and delays or avoids an item's entry in the waste collection and disposal system. Source reduction efforts currently undertaken by the County, businesses, and residents on Kaua'i are characterized in the following sections.

1.5.1 In-house Efforts

County agencies participate in a number of source reduction practices to increase awareness of waste diversion issues and decrease waste generation (for example, with an emphasis on paper reduction), including the following:

- Printing draft documents on the back sides of printed paper.
- Using the back sides of printed paper for scratch paper.
- Reviewing documents electronically and using electronic timesheets.
- Issuing memos electronically.
- Policy posting through the PowerDMS program.
- Accepting and issuing bidding and contracts documents electronically.
- Issuing electronic press releases to all County employees and media outlets.
- Providing electronic data, information, and reports on the County website.
- Reusing manila envelopes for sending in-house documents (envelopes are used dozens of times before they are recycled).

- “Grass-cycling” (leaving grass clippings on the lawn to decompose onsite) by the County Grounds Maintenance Department.
- The County has also enacted a “Policy to Limit the Purchase, Use, or Distribution of Single Use Plastics on County Property,” effective January 1, 2021. This policy prohibits “the purchase, use, or distribution of disposable plastics with County funds, at County permitted events, by County employees, or by County Facility Users.”¹⁶

1.5.2 Residential and Commercial Efforts

Many businesses in the County are involved in source reduction activities by providing opportunities for residents to reuse items rather than buying new products, as follows:

- **Thrift Stores.** Thrift stores not only provide an opportunity for residents to donate items such as clothing and household goods for reuse but also provide opportunities for those who need to buy these items to do so at minimal cost.

As with other thrift stores throughout the United States, Kaua'i's thrift stores are faced with the issue of cheap new goods being sold by Amazon and Walmart making it difficult to resell used items for profit on Kaua'i with its relatively small population.¹⁷

Habitat for Humanity has embraced technology to push out promotions and sales opportunities to their customers using a phone app with great success, while most other stores on-island rely on word of mouth or simple websites and Facebook pages with mixed success.¹⁸

A list of thrift stores located on Kaua'i can be found on the County's website.¹⁹

- **Building Supply Reuse.** There are two businesses that accept reused building supplies on Kaua'i: Habitat for Humanity and Restore Kaua'i Kapa'a.

Habitat for Humanity accepts and reuses building supplies for low-income housing construction projects. Habitat has partnered with many construction companies on Kaua'i to remove excess material for reuse, benefiting contractors who are able to report the donation for tax purposes and do not have to pay a disposal fee to remove the material from job sites.

Restore Kaua'i Kapa'a is a smaller operation without the staffing, facilities, or resources to push sales and operations to Habitat's level, but they are able to accommodate a large assortment of items due to land granted to the operations via a Hawaiian Homelands lease held by Aloha Roofing Supplies. It should be noted that Habitat for Humanity is also located on leased Hawaiian Homelands, which allows for lower property costs versus regular commercial industrial properties that would otherwise make it difficult to continue operations at a cost-effective level.

Both Habitat for Humanity and Restore Kaua'i Kapa'a resell donated building supplies and other household goods at their stores in Hanapēpē and Kapa'a.

Re-use Hawai'i, Hawai'i's largest deconstruction organization, has projects scheduled on Kaua'i in 2021. The County hopes to observe their projects in action to see how their process can be more fully implemented on-island.²⁰

- **Trade Radio.** This daily radio show on KONG AM 570 provides an opportunity for callers to buy, sell, or trade reusable items.
- **Food Banks.** Two food banks operate on Kaua'i: the Kaua'i Independent Food Bank and the Hawai'i Food Bank – Kaua'i Branch. The Kaua'i Independent Food Bank is a local non-profit organization that

¹⁶ County of Kaua'i. n.d. Policy to Prohibit the Purchase, Use, or Distribution of Disposable Plastics on County Property. https://www.kauai.gov/Portals/0/PW_Recycling/Plastic/County%20Policy%20Prohibiting%20Disposable%20Plastics%20-%20Website%20Version.pdf.

¹⁷ Information provided by County of Kaua'i staff. September 27, 2020.

¹⁸ Information provided by County of Kaua'i staff. September 27, 2020.

¹⁹ <https://www.kauai.gov/Government/Departments-Agencies/Public-Works/Solid-Waste/Recycling-Programs/Reuse>.

²⁰ Information provided by County of Kaua'i staff. September 28, 2020.

partners with many businesses, grocery stores, schools, and farmers with the goal of eliminating the waste of edible foods. The Kaua'i Independent Food Bank distributes nearly 200,000 pounds of food annually, equaling over 435,000 meals.²¹

The Hawai'i Food Bank – Kaua'i Branch is part of a statewide non-profit organization that collects, warehouses, and distributes perishable and nonperishable food through approximately 200 charitable agencies on O'ahu and Kaua'i with the aim of providing hunger relief to those in need. During FY 2018, the Hawai'i Food Bank – Kaua'i Branch provided 1.4 million pounds of food, including 178,000 pounds of fresh produce, to 13,223 Kaua'i residents.²²

Both agencies also work with pig farmers to divert food waste from the landfill, with approximately 224 tons of food waste going to local farmers.²³

- **Packing Material Reuse.** The County recycling office has a free drop-and-swap exchange for foam shipping peanuts and bubble wrap in the lobby of the KRC. This program offers residents a place to drop off their shipping materials for reuse by other residents or small businesses. The County does not keep track of users or quantities, but there is an active exchange of material on a daily basis.

The UPS stores in Līhu'e and Kapa'a take most packing material that is not dirty or stained for reuse in packages they send out, including expanded polystyrene blocks that are cut down to usable sizes. The stores occasionally reach drop-off capacity, so the County recommends calling ahead before dropping off material.²⁴

- **Pig Farms.** Local pig farmers currently collect food waste from certain local hotels, restaurants and the County jail to use as feedstock. While the County has been able to track some of the collections, most food collections of this type take place without the County staff's knowledge. During 2016, the County tracked 1,806 tons of food waste being reused in this manner.

Pig farmers tend to do business on a small scale and do not report their operations to the County or State. Many times sales go to local residents or other small businesses.

Kaneshiro Farms, the largest pig farming operation on Kaua'i, is closing their pig farm due to retirement of the current owner. It is unknown how much food waste was used by Kaneshiro Farms, but the loss of the operation could lead to a large impact on food waste disposal if other farmers are not able to take up the quantity that once went there.

Costs for farming have also caused some farmers to request a fee for food waste removal, turning a once symbiotic relationship into a cost point for businesses that rely on cheap food waste removal and a potential income source for farmers that are able to make a competitive offer for the service. It is unknown if charging by pig farmers will become the new norm or if businesses will balk at the new cost and move towards landfilling their food waste.²⁵

- **Vermiculture.** Several Kaua'i businesses offer vermiculture kits for composting using worms, training on how to vermicompost, and local worms. Worm bins offer an indoor composting option for those without access to a yard for an outdoor composting bin.²⁶

Importing of worms is restricted, which lead to relatively high costs for local worms, but this is offset if customers are able to raise their own worms properly as they propagate quickly.

Some operators claim that worm farming can be used to remediate old sugar cane land that has high levels of pesticides and herbicides and very little nutrient value. The County has not verified this information, but promotes the use of non-toxic and natural materials for residential garden and

²¹ <http://www.kauaifoodbank.org/About-Us/Our-History>

²² Hawai'i Food Bank. 2020. About Kaua'i Branch. <http://www.hawaiifoodbank.org/kauai>.

²³ Information provided by County of Kaua'i staff. October 4, 2020.

²⁴ Information provided by County of Kaua'i staff. September 27, 2020.

²⁵ Information provided by County of Kaua'i staff. September 27, 2020.

²⁶ County of Kaua'i. 2020. Composting. <http://www.kauai.gov/Composting>.

farming operations that include the use of worm castings and worm tea to add biotic material to soils without the need for store bought fertilizers.²⁷

1.5.2.1 Partnership with Thrift Stores

The County has established a partnership with thrift stores to generate additional reuse options for unsaleable yet usable materials donated on Kaua'i. Thrift stores on Kaua'i are able to send these materials to the KRC for consolidation, after which they are shipped to the Salvation Army Adult Rehabilitation Center (ARC) of Hawai'i, located on O'ahu. ARC is able to take almost any item and make it into something someone else can use. This program has shown a significant reuse enhancement for textiles. ARC sells rags, furniture, and clothing to markets locally, as well as in India and Asia. In addition to the environmental and social benefits of this type of source reduction, it costs less to ship reusable materials to ARC on O'ahu than to dispose of them in the landfill.

The project has increased material shipments by a factor of six during the COVID-19 shutdown. It will take several months to see if this impact continues, but there is hope that local thrift stores can reopen and take advantage of the program to send out their unsaleable items to make room for new donations that are now going to O'ahu.²⁸

1.5.2.2 Education

The County encourages source reduction and reuse in many ways, including publishing information in the Kaua'i Recycling Guide, fielding calls to the Recycling Office, having a booth and talking with residents at various community events, speaking to school children, and posting information on its website. The County website currently includes source reduction related topics such as food waste reduction tips, grass-cycling tips, and available reuse organizations. Additional details regarding the County's existing public education efforts can be found in Section 1.9.

In addition to County efforts, Zero Waste Kaua'i is a local advocacy group on the island that promotes zero waste principles and assists groups and organizations with zero waste events.

1.5.2.3 Home and Backyard Composting

The County offers free Earth Machine composting bins to residents in an effort to divert compostable food and yard waste from the landfill. This program has been in place since October 2001. Bins are available for pickup at the KRC on Fridays between 8 a.m. and 3:30 p.m., without an appointment. To receive a free bin, residents must agree to participate in an annual composting survey and view a 10-minute composting training video. The County's Composting webpage offers how-to information, troubleshooting tips, and frequently asked questions.²⁹ Free composting bins are also distributed by Kaua'i Worms, located on the north shore.

Compost bins are also offered to schools and non-profits to encourage education about the importance of food waste diversion and the benefits of composting for the environment, and County staff conducts onsite instruction for all interested agencies including businesses if they would like distribution of home composters to their employees for home use.

Compost County distributes approximately 350 to 450 units annually. An increase in distribution has been specifically noted under COVID, which resulted in a premature exhaustion of available units in FY 2021.³⁰

²⁷ Information provided by County of Kaua'i staff. September 27, 2020.

²⁸ Information provided by County of Kaua'i staff. September 27, 2020.

²⁹ <https://www.kauai.gov/Composting>.

³⁰ Information provided by County of Kaua'i staff. October 4, 2020.

The County is purchasing an additional 868 units, which should last into FY 2024.³¹

1.5.2.4 Technical Assistance to Businesses

The County's recycling coordinator assists businesses with recycling, waste reduction, and waste diversion issues. Most business assistance is provided by phone, with waste assessments conducted upon request. The waste assessments include a site visit to understand current waste management and recycling practices. Recommendations are made for improving recycling and reducing waste generated.

The County also provides digital signs, brochures, and site-specific material to assist businesses with educating their staff and customers on waste diversion options for their location. This includes two websites that cover general business recycling and vacation rentals (or other hospitality organizations) on Kaua'i.

County Staff can coordinate business to business solutions to provide waste diversion via paid or free programs including HI5 or recycling hauling to GID for processing.

With staffing this program could become an active outreach program, but at the moment, the County can only respond to requests on a first-come, first-served basis.

1.5.2.5 Zero Waste Resolution

On October 19, 2011, the County adopted Resolution No. 2011-73, Resolution to Adopt the Principles of Zero Waste as the Waste Management Policy for the County of Kaua'i (Zero Waste Resolution). The Zero Waste Resolution calls upon County agencies, residents, businesses, and visitors to adopt zero waste practices (reducing, reusing, and recycling) to meet the goal of 70 percent diversion by the year 2023.

The County notes that Kaua'i has achieved 40 percent diversion since the Zero Waste Resolution was passed; however, meeting the 70 percent diversion goal is dependent upon funding, staffing, necessary infrastructure, and legislation.

1.5.2.6 Plastic Ordinances, Bans, and Legislation

The Kaua'i County Council adopted a plastic bag reduction ordinance in 2009 that requires all commercial businesses selling goods directly to the consumer to provide only recyclable paper bags or reusable checkout bags to their customers beginning January 11, 2011. This legislation was intended to reduce litter, threats to marine life, and the burden on the landfill associated with single-use plastic bags. Retailers may offer compliant checkout bags as a courtesy or for sale, though customers are encouraged to bring their own reusable bags when shopping. The County Solid Waste Division enforces the plastic bag reduction ordinance by issuing notices to non-compliant businesses and following up with fines for continued failure to comply.³² The County has seen overall compliance under this ordinance.

In addition, in September 2020 Mayor Derek Kawakami signed Bill 2775, which prohibits retail and food establishments from using, distributing, or selling foam polystyrene disposable food serviceware. This ban will become effective in January 2022. The County has also enacted a "Policy to Limit the Purchase, Use, or Distribution of Single Use Plastics on County Property," to be effective January 1, 2021. This policy prohibits "the purchase, use, or distribution of disposable plastics with County funds, at County permitted events, by County employees, or by County Facility Users."³³

The County is currently working on a second, complementary bill to require compostable serviceware.

³¹ Information provided by County of Kaua'i staff. October 4, 2020.

³² <https://www.kauai.gov/BagOrdinance>.

³³ County of Kaua'i. n.d. Policy to Prohibit the Purchase, Use, or Distribution of Disposable Plastics on County Property. https://www.kauai.gov/Portals/0/PW_Recycling/Plastic/County%20Policy%20Prohibiting%20Disposable%20Plastics%20-%20Website%20Version.pdf.

1.5.2.7 Pay As You Throw

The PAYT ordinance was adopted by the Kaua'i County Council in 2014 and went into effect in July 2015. PAYT is a variable rate for refuse collection service under which residents are charged in accordance with the size of their refuse cart or carts. Offering different levels of service through varying sizes and numbers of refuse containers creates a financial incentive for residents to reduce the amount of refuse they set out each week and encourages recycling and diversion.

The County's PAYT system includes two components: a base fee and a variable fee. All residential customers are assessed a flat fee that is meant to subsidize the cost of operating the RTSs. An additional fee is assessed for curbside refuse collection based on size and number of carts. The fee is higher for the larger 96-gallon cart than for the smaller 64-gallon cart, and the fee for an additional cart is higher than the fee for the first cart. Residents retain the option to drop off waste at the RTSs and landfill at no additional charge. Additional details regarding PAYT cart fees can be found in Section 1.4.1.³⁴

1.6 Recycling and Bioconversion

1.6.1 Recycling

1.6.1.1 Residential Drop Bin Program

The County has a voluntary recycling program (that is, residents are not mandated to recycle) for source-separated recyclables. Currently, there are eight drop-off sites in the County for the collection of the following items generated by residents (commercially generated materials are not accepted in the bins):

- Corrugated cardboard.
- Glass bottles and jars.
- Household metals (for example, steel cans and clean aluminum foil and pie tins).
- Plastic bottles and jars (#1 and #2).
- Mixed paper including newspaper and boxboard.

Table 1-4 lists the drop bin locations and tons collected in FY 2019.

Table 1-4. Kaua'i Recycles Drop Bin Locations and Tons Collected

City/Area	Location	Tons, FY 2019
Hanalei	Hanalei RTS	373.4
Kapa'a	End of Kahau Road	471.2
Līhu'e	K-Mart Parking Lot	497.4
Po'ipū	Brennecke's Beach Broiler	208.3
Hanapēpē	Hanapēpē RTS	190.8
Waimea	Waimea Canyon Park	116.4
Kekaha	Kekaha Landfill	24.6
Lāwa'i	Lāwa'i Post Office	233.4
Total		2,116

Table 1-5 shows the tons of recyclable material collected by material type in FY 2019 from the drop bin locations.

³⁴ <https://www.kauai.gov/PAYT>

Table 1-5. Kaua'i Recycles Drop Bin Materials (in tons)

Material	Tons, FY 2019
Cardboard	939.9
Mixed Paper	675.4
Glass	317.6
Aluminum	0.3
Steel	76.6
Plastic	105.7
Total	2,116

The County has a contract with GID to operate the program as follows:

- Providing and maintaining the recycling drop bins.
- Posting signage at the sites and on bins.
- Hauling recyclables on an established schedule for each site, with the three busiest sites hauled more than daily (except Sundays).
- Maintaining sites and clearing any illegal disposal.
- Collecting office paper from the County's office buildings.
- Processing all materials.
- Marketing the materials.

In addition, the program includes bins for cardboard collection at the Civic Center and police complex and bins at the Civic Center for collection of cans and bottles not covered under the deposit beverage container (DBC) program, commonly referred to as HI5.

Most of the recyclable materials are transported off-island to markets. GID retains any revenue from the sale of recyclable material. Glass is crushed and available for reuse applications such as: construction backfill, cesspool fill, asphalt mix, water filtration, and sandblasting. More information on glass recovery and recycling is included in Section 1.6.1.5, Other Recycling Programs.

1.6.1.2 Kaua'i Resource Center

The County owns and operates the KRC, which is open weekdays from 8 a.m. through 4:15 p.m., excluding holidays.³⁵ Located in Līhu'e, the KRC serves as a HI5 certified redemption center (CRC), education center, and office facility for County staff.

Programs run by the County out of the KRC include the following:

- Facilitation of recycling education programs.
- Storage of educational materials, HI5 bins, and other supplies for the County's RTSS.
- Storage and distribution of free home composting bins every Friday.
- Free battery recycling for residents (that is, alkaline, lithium, and nickel-cadmium [NiCad]).
- Free fluorescent tube recycling for residents, beginning May 2021.
- Drop-and-swap for bubble wrap and packing peanuts.
- Partnership with thrift stores to facilitate reuse.
- Biannual HHW events in January and July.

Reynolds Recycling operates a HI5 redemption center for plastic, glass, and aluminum beverage containers at the KRC, as well as a buy-back program for non-ferrous scrap metal (such as aluminum,

³⁵ County of Kaua'i. 2020. The Kaua'i Resource Center. <https://www.kauai.gov/KauaiResourceCenter>.

brass, copper and stainless steel). Hours of operation for the HI5 redemption center are Monday through Saturday from 9 a.m. through 5 p.m., with a break from 12 p.m. through 1:30 p.m. for lunch.

The KRC is also a mixed-use base yard for County Solid Waste Division operations, with several storage areas dedicated for field supplies and open areas for vehicle parking and cleaning. Currently, the Solid Waste Division does not have a dedicated base yard facility outside of the Kekaha Landfill. Vehicles and supplies are stored at several County Roads Division base yards around the island.³⁶

1.6.1.3 Deposit Beverage Container Program

The HDOH manages the DBC program, whereby a 5-cent deposit per beverage container is charged for the purchase within the state of specific glass, aluminum, and plastic containers defined under the law. A 1-cent non-refundable container fee is also assessed to support the costs of recycling and program administration. Beverages included under the law are soft drinks, beer, drinks with limited alcoholic content, juices, water, teas, and sports drinks. Excluded beverages include but are not limited to wine, milk, and hard liquor. Residents receive a 5-cent deposit refund per container, or an equivalent segregated weight payment for loads of 200 containers or more, when containers are brought to a CRC to be recycled.³⁷ In turn, CRCs are reimbursed by the HDOH for the 5-cent deposit and also receive a handling fee, which has recently been revised. In FY 2021, handling fees will raise to the following rates per container: 3.3 cents for aluminum and bi-metal, 7.8 cents for glass, 3.9 cents for plastic, and 3 cents for bi-metal.

As shown on Figure 1-1, five privately operated CRCs operate throughout the County. Redemption centers operate on different schedules, with some offering limited days and hours of operation; redemption center schedules are shown on the County website.³⁸

Currently, redemption center operators are transporting most of the redeemed DBCs to GID in Līhu'e for processing and marketing (one exception is Kaua'i Community Recycling Services, which currently processes and markets its own aluminum). The quantity of deposit beverage containers redeemed in FY 2019 from the County was 36,252,146 units, which converts to approximately 1,936 tons of material.

Two HI5 recycling specialists oversee the DBC program. The positions are funded through a grant from the HDOH's Beverage Container Deposit Program. The grant also funds County-contracted redemption centers and related costs.

The HI5 program is one of the most effective programs in the state, with a 62 percent redemption rate in FY 2019. However, this is down from a high of 76 percent in FY 2010 and 2011.³⁹

In 2013, China implemented its Green Fence Initiative, which severely impacted scrap values for all commodities.⁴⁰ This impact stretched into 2015, where overall low scrap values and higher rent caused many redemption centers to go out of business. This downturn, combined with the lower value of the nickel over time, could be factors in the overall decline of the program's redemption rate.⁴¹

The HDOH recommended a small increase in handling fees paid to redemption center operators, which went into effect in FY 2020. A comparison of prior and new handling fees is shown in Table 1-6. This was the first increase in 11 years and was based on the wage index, minimum wage adjustment (COLA), health care adjustments, shipping adjustment, and fuel adjustment.

³⁶ Information provided by County of Kaua'i staff. October 4, 2020.

³⁷ State-regulated segregated weight payments by material are listed on the County's website: <https://www.kauai.gov/hi5>.

³⁸ <https://www.kauai.gov/Hi5d>

³⁹ Information provided by County of Kaua'i staff. October 4, 2020.

⁴⁰ Resource Recycling. 2013. Operation Green Fence is hurting plastic export markets. <https://resource-recycling.com/plastics/2013/04/12/operation-green-fence-hurting-plastic-export-markets/>.

⁴¹ KHON2. 2016. Recent shutdown of recycling redemption centers catch many by surprise. <https://www.khon2.com/news/recent-shutdown-of-recycling-redemption-centers-catch-many-by-surprise/1025364017/>.

Table 1-6. Comparison of Prior Handling Fees and New Handling Fees Per Container

DBC Material Type	Prior Handling Fee, Oahu	Prior Handling Fee, Neighbor Islands (including Kaua'i)	New Handling Fee, All Islands
Aluminum	2 cents	3 cents	3 cents
Glass	4 cents	4 cents	7 cents
Plastic	2 cents	3 cents	3.5 cents
Bi-metal	2 cents	3 cents	3 cents

The County has submitted testimony to the state legislature to modify the law to increase the deposit fee, which would create an incentive for additional recycling.⁴²

1.6.1.4 Puhi Metals Recycling Center

The Puhi Metals Recycling Center is privately operated by Resource Recovery Solutions, LLC (RRS). The facility is open every day except Sunday, from 7:30 a.m. to 3:30 p.m. The center accepts and recycles appliances (with or without refrigerant), scrap ferrous metals, tin/steel cans, depressurized propane tanks, vehicles, and small motorized goods such as scooters, lawnmowers, and motorcycles from the County, the general public and commercial entities. The services are provided free of charge to residential users and for a fee to commercial users.⁴³ In FY 2019, the Puhi Metals Recycling Center recycled 4,884 tons of metal, including appliances and vehicles, and 200 tons of eWaste (which is collected free of charge from businesses and residents). All electronic material collected is sent to a certified R2 or eSteward facility

As Kaua'i's only metal and eWaste recycling facility, the Puhi Metals Recycling Center is integral to the County's waste diversion efforts. RRS signed a 10-year contract to provide service to residents, which will expire in 2028.⁴⁴

Puhi Metals and RRS are also the only permitted and certified refrigerant removal and recycling company on Kaua'i.

Extremely low scrap metal prices, the high cost of shipping, increased labor costs, and overhead may affect the current service model, but RRS is committed to servicing Kaua'i's residents at a reasonable rate to ensure the long-term viability of metal and eWaste recycling. To better track loads and implement increased cost efficiencies, a truck scale was installed in FY 2021.⁴⁵

1.6.1.5 Other Recycling Programs

- Business Recycling – There are a mix of large and small commercial refuse haulers in the County. GID is the largest commercial refuse hauler in the County and also offers recycling hauling services to businesses for a fee. GID also has a contract with the County to accept and process commercially generated recyclables at their facility at no charge. The following materials are accepted for recycling by GID and processed at their facility in Līhu'e:
 - Old corrugated cardboard (OCC).
 - Mixed paper, including newspaper and boxboard.
 - Glass bottles and jars.
 - Plastic #1 and #2 bottles and jars.

⁴² Information provided by County of Kaua'i staff. October 13, 2020.

⁴³ eWaste is accepted from residents and businesses for recycling free of charge with no quantity limits. Additional information regarding eWaste is provided in Section 6.

⁴⁴ Information provided by County of Kaua'i staff. October 12, 2020.

⁴⁵ Information provided by County of Kaua'i staff. October 12, 2020.

- Aluminum and steel cans.

The contract also includes the acceptance and processing of HI5 recyclables from CRC operators and requires all of the documentation for State reimbursement for the CRCs. This program enables the processing of HI5 containers from CRCs, which would not be possible without this contract in place. This program is also integral to County Ordinance 902, which bans the disposal of corrugated cardboard generated from businesses. Without options for recycling commercial cardboard, Ordinance 902 would be unenforceable. The contract also enables future restrictions on other recyclables, such as mixed paper, which may be considered if commodity values ever rebound.⁴⁶

- Scrap metal accepted at all RTSs – This program, along with all the other waste diversion programs located at transfer stations, aims to reduce illegal dumping, which could lead to environmental impacts and high cleanup costs for the County.⁴⁷
- Backhauling – Many large retailers in the County “backhaul” their cardboard, pallets, and plastic pallet wrap by shipping it back to the mainland in empty shipping containers. The County has collected basic data indicating that many large box stores and chains have backhaul programs in place. Backhaul programs reduce cost to businesses that may pay lower disposal costs or may receive a payment based on the volume of material brought in for recycling for material shipped back to the mainland. The cost for shipping is oftentimes rolled in to the cost of business, as the containers are sent back with item returns, overstock, seasonal store fixtures, and other displays.⁴⁸
- Advance Deposit Fee (ADF) Glass Recovery and Recycling Contract – Historically, the County had received an annual grant from the State for advance disposal fees for non-deposit glass. The County forfeited ADF glass funds for FY 2018 since the funding level provided by the State was not sufficient to cover all the costs associated with receiving, processing, and managing a buy-back and recycling program as required by the HDOH. The County will recommend legislative changes to increase the funding available for this on par with the Deposit Beverage Program as this would incentivize increased non-HI5 glass recycling that includes all containers made of glasses beyond just beverages.⁴⁹
- eWaste – Electronic waste recycling is addressed in Section 6.

1.6.2 Bioconversion of Green Waste

The County has a voluntary green waste diversion program for residents. Residents can divert green waste free of charge at any of the four RTSs or at the landfill. Commercial haulers can also divert green waste at all RTSs for a fee that is currently far below the landfill tip fee. Materials accepted include:

- Lawn trimmings.
- Yard waste.
- Tree trimmings (such as stumps, branches, leaves).
- Shrubbery.
- Christmas trees (unflocked).
- Sod with Soil (small loads).

The County asks that residents separate green waste from all other waste. Residents must cut materials, such as logs and stumps that are more than 8 inches in diameter, into lengths of 8 feet or less. In FY 2019, approximately 21,438 tons of green waste were collected and shredded by County operations.

The County contracts with permitted green waste recyclers to accept, shred, and compost green waste collected at the RTSs. Green waste is by far the largest diversion activity for the County. Although the program is voluntary for residents, participation in the program is extremely high.⁵⁰

⁴⁶ Information provided by County of Kaua'i staff. October 12, 2020.

⁴⁷ Information provided by County of Kaua'i staff. October 12, 2020.

⁴⁸ Information provided by County of Kaua'i staff. October 12, 2020.

⁴⁹ Information provided by County of Kaua'i staff. October 12, 2020.

⁵⁰ Information provided by County of Kaua'i staff. October 20, 2020.

Commercially generated green waste is restricted from disposal by County ordinance, which also contributes to the high diversion rate for this material. Commercially generated green waste can be taken directly to any of the permitted green waste composters in the County for a fee, though some may require an appointment:

- Heart and Soul Organics in Kīlauea.
- Green Earth Matters in Kīlauea.
- Kaua'i Nursery and Landscaping in Līhu'e.
- DMK Associates in Kekaha.

Small loads of commercially generated green waste are also accepted at County RTSs with tip fee coupons obtained through the Department of Motor Vehicles. Commercial haulers bringing green waste to RTSs must comply with ordinance restrictions on vehicles.

1.7 Special Waste Management

HRS Section 342G-1 defines special waste as “any solid waste that, because of its source or physical, chemical or biological characteristics, requires special consideration for its proper processing or disposal or both. This term includes, but is not limited to, asbestos, used oil, petroleum-contaminated soil, lead acid batteries, municipal waste combustion ash, sewage sludge that is not hazardous waste, agricultural and farm-generated wastes that are normally placed in landfills, medical wastes, tires, white goods, and derelict vehicles.”

Per Chapter 21 of the Kaua'i County Code, special wastes include “tires, asbestos-containing materials, white goods, and dead animals (except those disposed of by the Kaua'i Humane Society), and any mixed waste containing used tires, asbestos-containing materials, white goods, or dead animals. These wastes are defined as ‘special’ because they require special handling or processing by the County to comply with federal and state regulations.”

Though not specifically mentioned in HRS Section 342G-1 or Chapter 21 of the Kaua'i County Code, the County also considers household batteries, propane tanks, used cooking oil, and construction and demolition (C&D) materials to be special waste. Special waste is managed by the County as described in the following sections and as detailed in the Kekaha Landfill Solid Waste Management Permit.

1.7.1 Asbestos-containing Materials

Federal regulations governing the handling, transportation, and disposal of asbestos-containing material (ACM) are known as the National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 61). Requirements for asbestos disposal include maintenance of waste shipment records, maintenance of records of location and quantity of waste disposed, and standards for covering the waste. Homeowners are exempt from federal regulations regarding the disposal of ACM.

Examples of activities that generate ACM include the following:

- Demolition of buildings containing asbestos.
- Maintenance of existing/operational facilities or systems that have asbestos insulation.
- Asbestos abatement projects.

The HDOH is the agency responsible for enforcing federal and local asbestos regulations. ACM is disposed of at the landfill in accordance with the Kekaha Landfill Solid Waste Management Permit and requires a waste profile sheet that must be completed by the generator and approved by the landfill. Upon notification of an asbestos-containing load, a trench/pit is specially prepared. The hauler unloads the material into the trench, after which the material is immediately covered with 24 inches of MSW and then daily cover at the end of the working day.

The landfill accepts Category I and Category II nonfriable asbestos-containing waste materials, as defined in the U.S. Environmental Protection Agency (EPA) National Emission Standard for Asbestos at 40 Code of Federal Regulations (CFR), Part 61.

1.7.2 Agricultural Wastes

Agricultural wastes include animal and plant residues from the agricultural process, such as manure, carcasses, sludge from rendering plants, and food processing wastes. Most agricultural waste is processed through bioconversion at the site where it is generated. The County is not responsible for agricultural waste, and the responsibility for treatment and disposal belongs to the generator. Responsibility for treatment and disposal belongs to the generator. Dust, odors and smoke from the disposal of agricultural waste are regulated by the HDOH. The regulations reduce the impacts of agricultural operations on nearby residential areas.

1.7.3 Infectious Medical Wastes

Hawai'i Administrative Rules (HAR) Title 11, Chapter 104.1 refers to infectious waste as "any waste which may contain pathogens capable of causing an infectious disease and shall include, but not be limited to, wastes in the following categories:

- Infectious isolation waste
- Cultures and stocks of infectious agents
- Blood, blood products, and other body fluids
- Human pathological waste
- Contaminated sharps
- Animal waste

Facilities that may contribute to the infectious waste stream in the County include hospitals or clinics, nursing homes, medical laboratories, funeral homes, dental offices, livestock operations and households.

The HDOH is the regulatory authority responsible for regulation of infectious medical waste management practices in the County. Chapter 104.1, Title 11, states the following:

Before disposal, infectious waste may be incinerated, sterilized, or chemically disinfected on site in accordance with... the current Centers for Disease Control's recommendations on universal precautions for prevention of transmission of HIV immunodeficiency virus, hepatitis B virus and other blood borne pathogens in health care settings; the current U.S. EPA guide for infectious waste management; Part 1910, Occupational Safety and Health Administration standards, of Title 29 of the Code of Federal Regulations, Subpart Z; the current Clinical and Laboratory Standards Institute waste management guidelines; and by other methods approved by the aforementioned agencies or the department.

In general, regulations require that infectious medical waste must be sterilized (rendered non-infectious) or incinerated. If waste is sterilized, the bag must indicate sterilization.

Generators of infectious medical waste on Kaua'i either sterilize the material and transport it to the landfill for disposal, incinerate it onsite, or contract with private companies to transport it off-island. The landfill does not accept infectious waste that has not been sterilized, and generators of infectious waste must contract with private companies to properly manage this material. Treated medical waste is disposed of at the landfill in accordance with the Kekaha Landfill Solid Waste Management Permit. Upon notification of a treated medical waste load, a trench/pit is specially prepared. The waste is unloaded near the trench and landfill equipment pushes the material into the trench. The trench is immediately backfilled with waste and then daily cover at the end of the working day.

1.7.4 Abandoned and Derelict Vehicles

The Police Department operates an Abandoned/Derelict Vehicle Program to properly remove illegally abandoned vehicles on public property. The vehicles are tagged and, if unclaimed after 24 hours, are taken to the Puhi Metals Recycling Center for storage and pre-processing. Ultimately, the unclaimed vehicles are shipped to O'ahu for final processing.⁵¹

Besides the visual impacts abandoned and derelict vehicles have on our island, they are also an environmental issue with leaking fluids and other contaminants leaching out into the soil and water table if the vehicle is not removed quickly.

There are issues with the collection and storage of these vehicles as many times the owner on record is not the person that currently has possession of it. This is often due to improper transfer or junking of the vehicle. Also, these vehicles may be used by individuals as temporary housing and storage. This makes processing dangerous for RRS, who must contend with extra tires, propane tanks, illegal contraband, and other hazardous material that arrive with the vehicle.

With approximately 550 vehicles being illegally disposed of every year, the Mayor has formed an Abandoned Vehicle Task Force to address the issue of proper vehicle disposal. The County continues to review and implement programs put forth from the task force that reduce the actual and perceived impediments to proper vehicle disposal. These programs should reduce the cost for proper disposal, including reducing or removing back taxes on vehicles, providing tow services for low-income families, increasing awareness of current programs, implementing a check-and-balance system to hold buyers accountable for registering a vehicle that they have purchased from a previous owner (which will require modification of the applicable HRS), and working with the legislature to reduce the liability of the County in regard to marking vehicles as derelict.

Residents are allowed to dispose of up to three vehicles every year free of charge using the County's Waive, Release, and Indemnity Agreement form or an unlimited amount of vehicles if a Junking Affidavit is used at the DMV. The current thought is that the paperwork involved with vehicle disposal or the cost of back taxes and towing may be impediments to the quick disposal of vehicles by residents.

Ultimately, all vehicles brought to Puhi Metals are preprocessed on-island then shipped to O'ahu for final processing unless they are claimed by the rightful owner.⁵²

1.7.5 Sewage Sludge

Sewage sludge refers to the residual solids and semi-solids separated during the treatment of wastewater by municipal and private wastewater treatment plants. Sewage sludge is also commonly referred to as biosolids. These two terms refer to the same type of material, with the notable difference that the term "biosolids" is defined as treated sewage sludge that specifically meets EPA pollutant and pathogen requirements for land application and surface disposal.

The County lacks heavy industry and therefore sewage sludge on the island is generally low in heavy metals, devoid of potentially toxic chemicals and is not considered a hazardous material. The landfill currently accepts dewatered sludge from municipal wastewater treatment plants and private treatment plants. The sludge must pass a paint filter test (that tests for the presence of free liquids) for it to be accepted at the landfill. Sewage sludge is disposed of at the landfill in accordance with the Kekaha Landfill Solid Waste Management Permit. Sewage sludge comprises about 5 percent of the waste disposed of at landfill and this organic matter would ideally be diverted. The County Waste Water Division is currently working on a plan with Green Energy to determine the feasibility of land-applying dewatered sewage sludge in the future.

⁵¹ County of Kaua'i. n.d. How to Dispose of a Vehicle. <https://www.kauai.gov/VehicleDisposal>.

⁵² County of Kaua'i. n.d. How to Dispose of a Vehicle. <https://www.kauai.gov/VehicleDisposal>.

1.7.6 White Goods

White goods are major appliances composed primarily of metal. White goods from residents are accepted year-round at the Hanalei, Kapa'a, and Hanapēpē RTSs and at the landfill, then taken to Puhi Metals for recycling. In the Līhu'e area, residents must take their white goods directly to Puhi Metals. Commercially generated white goods are not accepted at the RTSs and must be taken to Puhi Metals where they are accepted for a fee.⁵³

The County stages the appliances at each of the above County sites and then segregates them into materials that contain refrigerants and materials that do not contain refrigerants. Refrigerant-containing white goods must be specially handled to reduce the chance of accidental release of refrigerants. Haulers must use machinery adapted for lifting appliances without damage or units must be hand-loaded.

A private contractor is used to remove the stockpiles twice a week and haul them to the Puhi Metals Recycling Center for processing and recycling.

1.7.7 Scrap Tires

Under Hawai'i State law (HRS Section 342I, Part II), tire retailers are required to charge a disposal fee for tires when new tires are purchased and to take back the same number of old tires that are sold. Fees like these are generally used to encourage customers to return the tires to the retailer for proper disposal. Unmanaged tire piles provide potential breeding grounds for mosquitos and also pose fire hazards⁵⁴. Even with this fee, customers do not always leave tires with the retailer. In addition, large quantities of tires are imported to Hawai'i annually from retailers that are not covered under this law. As a result, hundreds of tires are still being dropped off at the RTSs every week.

Residential scrap tires are accepted at the four RTSs and the landfill at no charge. Acceptance of residential tires free of charge at these five locations throughout the island results in little to no illegal dumping, which is a problem in other islands where there are limited options for free disposal. The tires collected at the County's five sites are removed weekly by a private contractor for recycling.

The County contracts hauling and tire recycling with haulers that have a permitted disposal facility in Hawai'i or on the mainland. Tires from commercial users are not accepted at the RTSs but can be taken to Unitek Solvent Services, and PS&D Tires, (all in Līhu'e) for a fee.

Tires can be processed for tire-derived fuel (TDF), crumbed for with metal removed for landscaping, or made in to tire-derived aggregate (TDA) for use in construction projects. New processes including pyrolysis and devulcanization are coming online, but the bulk of tires brought in for disposal will be used as fuel for energy production.

1.7.8 Used Motor Oil

The County funds a residential used-motor-oil recycling program. Residential used-motor-oil and used-motor-oil filters are accepted for recycling at each of the four RTSs, and the landfill. The motor collection area is covered and includes a berm and secondary containment units to prevent spills from entering the environment. The County procures spill kits and cleaning supplies specifically to manage accidental motor oil discharge.

Residents must sign in when they dispose of their oil, and they are restricted to 5 gallons a month.

There are issues with residents disposing of solvents or other liquids into the motor oil drums, which causes contamination to the material. Contaminated motor oil must be hauled by a hazardous waste

⁵³ County of Kaua'i. n.d. Appliance Recycling. <https://www.kauai.gov/Government/Departments-Agencies/Public-Works/Solid-Waste/Recycling-Programs/Appliance-Recycling>.

⁵⁴ State of Hawai'i Department of Health. Fact Sheet. <https://health.hawaii.gov/shwb/files/2018/04/TireFactSheetUpdated2017.pdf>

contractor at premium cost as the hauler must come down from O'ahu and the material must be shipped to the mainland for proper disposal.

Attendants have been trained to notify customers if they are using the wrong containers to bring in the oil, such as detergent bottles or gas cans. Residual material from these types of containers can significantly contaminate used motor oil. Attendants should also be locking the motor oil drop-off unless needed by a customer.

1.7.9 Lead Acid and Household Batteries

The County accepts lead acid and household batteries during its semiannual HHW collection events. Household batteries generated from residents can also be dropped off at the KRC for recycling 5 days a week. The KRC does not accept lead acid batteries. Most auto parts stores and retailers that sell lead acid batteries will accept used batteries upon request with the purchase of a new battery. Auto service stations recycle old batteries when they install a new one. A list of retailers that accept lead acid batteries can be found at www.kauai.gov/BatteryRecycling.⁵⁵

The Kaua'i Resource Center drop-off is a convenient location for residents as it is available Monday through Friday from 7:45 a.m. to 4:15 p.m. However, as a self-service program, there are issues with cross-contamination of batteries due to residents putting the wrong battery types into each drum and failing to tape 9-volt batteries, which is a Department of Transportation requirement for their transport. Residents also leave lead acid batteries at the drop point, which is not allowed per the County's permit. The KRC battery collection program requires a lot of manual labor to sort the various batteries that are received and to assure that 9-volt battery contacts are taped prior to recycling.

Multiple signs have been posted directing residents on the proper disposal procedure, but a live one-on-one tour of the drop points has been the most effective training process.

1.7.10 Pressurized Tanks

The County has made some progress with their pressurized tank program, which was still in development under the last ISWMP. Since then, issues with pressurized tanks have diminished significantly. However, pressurized tanks still pose a challenging waste stream for the County to manage.

The County accepts residentially generated propane tanks (sized from 16 ounces to 10 gallons, with valves intact) at the RTSs for recycling, free of charge. The RTSs are not allowed to accept oversized tanks, but residents and suspected businesses still drop them off. The contractor that manages Puhi Metals hauls the tanks from the RTSs once per week.

Puhi Metals accepts de-valved non-acetylene tanks from residents at no cost. Puhi Metals and Airgas accept residentially generated tanks exceeding 10 gallons and commercially generated pressurized tanks for a fee. Acetylene tanks are considered hazardous waste and are not accepted at any RTS, the Kekaha Landfill, or the Puhi Metals Recycling facility.

Recently, illegal dumping of acetylene tanks has become an issue at the RTSs and landfill. Acetylene tanks are considered hazardous waste and cannot be disposed of with MSW or at Puhi Metals. A certified hazardous waste hauler must package and ship containers individually to the mainland for disposal in a designated hazardous waste landfill.⁵⁶

Attendants will continue to monitor scrap metal drop-off at the RTSs to reduce the illegal drop-off of acetylene. Unfortunately there are no easy or inexpensive disposal options for these types of containers which force some businesses and residents to continue to illegally dump these containers at County facilities.

⁵⁵ County of Kaua'i. n.d. Battery Recycling. <https://www.kauai.gov/BatteryRecycling>.

⁵⁶ County of Kaua'i. n.d. Propane & Other Pressurize Tanks. <https://www.kauai.gov/Government/Departments-Agencies/Public-Works/Solid-Waste/Recycling-Programs/Propane-Other-Pressurize-Tanks>.

1.7.11 Used Cooking Oil

Kaua'i Grease Traps is the only company in the County that collects used cooking oil from businesses. They conduct this service for a fee in conjunction with grease trap servicing. The used cooking oil is sold to a company in Honolulu that recycles it into biodiesel fuel. The County's website advises residents to dispose of used cooking oil by pouring it into a box with absorbent material and placing the box in a garbage bag for curbside pickup.⁵⁷

There are minimal requests for this public service at this time, but some residents do collect the oil in hopes that the County will bring back this program to divert used cooking oil from the landfill.

1.7.12 Construction and Demolition Materials

C&D materials represent a distinct waste stream, comprise a large portion of the overall waste stream, and may pose material handling challenges. The waste composition study conducted in 2016 estimated that the overall solid waste stream (all materials landfilled) at that time included approximately 24 percent, or approximately 19,800 tons, of inerts and other C&D.⁵⁸ The amount of C&D generated can vary considerably over time because quantities disposed are directly influenced by the scope of residential and commercial building activities and economic activity. Presently, activities to source separate and recover these materials are very limited in the County. There are opportunities to improve these efforts.

In many instances, C&D is delivered to the landfill for disposal in collection vehicles, such as roll-offs, dedicated for collection and transport from specific construction job sites. Pacific Concrete Cutting and Coring (PCCC) accepts concrete and asphalt for at a lower tip fee than the landfill, diverting much of the concrete and asphalt debris generated on Kaua'i.

Potential processors of C&D material are looking at possibly shredding materials to de-bulk them before they are sent to the Kekaha Landfill. ShredCo, located in Kekaha, has a solid waste permit to crush bulky waste and lumber for volume reduction prior to disposal at the landfill. The solid waste permit also includes the recycling of clean and unpainted asphalt and Portland cement concrete. So far, efforts to de-bulk material prior to landfill disposal have been limited to pilot scale trial programs. The County may investigate requiring pre-processing of C&D materials in the future as a potential strategy to preserve landfill capacity, but is not currently pursuing this possibility.

Other possible options are working with former sugar cane operators and large agricultural land owners to discuss opening an inert C&D landfill on unused land.

1.7.13 Petroleum-Contaminated Soil

The County accepts petroleum-contaminated soil at the landfill. The generator is responsible for testing the content of the soil. Petroleum-contaminated soil is disposed of at the landfill in accordance with the Kekaha Landfill Solid Waste Management Permit.

1.7.14 Dead Animals

The County accepts dead animals at the landfill. Dead animals are disposed of at the landfill in accordance with the Kekaha Landfill Solid Waste Management Permit. Upon notification of a dead animal load, a trench/pit is specially prepared. After placing the animal waste into the trench, the trench is immediately covered with 24 inches of MSW and then daily cover at the end of the working day.

⁵⁷ County of Kaua'i. n.d. Used Cooking Oil Recycling. <https://www.kauai.gov/Government/Departments-Agencies/Public-Works/Solid-Waste/Recycling-Programs/Used-Cooking-Oil-Recycling>.

⁵⁸ Cascadia Consulting Group. 2017. County of Kaua'i Waste Characterization Study. Final.

1.7.15 Municipal Waste Combustion Ash

The County does not have incineration or waste-to-energy (WTE) facilities for MSW, and no hospitals still operate incinerators for infectious medical waste.

1.8 Household Hazardous Waste and Electronic Waste

1.8.1 Household Hazardous Waste

Since 2002, the County has sponsored semiannual HHW collection events for residents to dispose of dangerous, poisonous, toxic, flammable, and other potentially harmful products free of charge (a list of accepted materials can be found at www.kauai.gov/HHW). Commercial and institutional waste is not accepted. The events are held at four locations, two locations per day, from 8 a.m. to 3 p.m.⁵⁹ The County contracts with a hazardous materials handling and disposal company to provide collection, packaging, transportation, recycling, and disposal services. Selected vendors are responsible for obtaining the required State hazardous waste permits. Materials accepted at HHW collection events include, but are not limited to, the following:

- Automotive products.
- Cleaners.
- Pesticides.
- Solvents.
- Corrosives.
- Flammable liquids.
- Swimming pool chemicals.
- Oil-based paints, thinners and stains.
- Antifreeze.
- Lead acid batteries.
- Alkaline, lithium, and NiCad batteries.
- Fluorescent tubes and compact fluorescent lightbulbs.
- Mercury-containing thermometers and thermostats.⁶⁰

During the collection events, the County recycling coordinator monitors the events by observing and documenting quantities of HHW collected and answering questions from the public, while the contracted vendor accepts and properly packages the HHW materials. The contracted vendor is also required to collect participant information (that is, name, address, description of materials, estimated quantities, and signature) from every resident who drops off HHW materials.

In preparation for the annual events, the County advertises in the local newspaper, conducts radio ad campaigns, and hangs banners at the RTSSs prior to the events listing the dates and times. The County website provides a list of the items accepted at the HHW collection events and has HHW information accessible year-round, including instructions for disposing of certain materials at home. The County recycling office fields calls throughout the year regarding HHW and proper disposal options and collects names and phone numbers of people storing HHW who want to be contacted directly in advance of the events.

There are currently no hazardous waste management facilities in the County. As a result, residents who are moving off-island or need to dispose of HHW have no options. Options are also limited for small businesses to properly dispose of their hazardous waste, as hazardous waste management companies typically do not want to travel to the County to collect small volumes of materials. A list of haulers and recyclers for commercial hazardous waste is can be found at www.kauai.gov/HHW.

⁵⁹ County of Kaua'i. n.d. Hazardous Waste. <https://www.kauai.gov/hhw>.

⁶⁰ County of Kaua'i. 2017. What Do I Do With Unwanted Household Hazardous Waste (HHW)? https://www.kauai.gov/Portals/0/PW_Recycling/New%20HHW%20locations%20front%20page%20blank%20date.pdf?ver=2017-12-08-104024-143.

1.8.2 Electronic Waste

Electronic waste, or eWaste, includes discarded computers, cell phones, televisions and other electronic products. When eWaste is not disposed of or recycled properly, the toxic materials that are contained in these products can cause problems. Commercial CRT and LCD monitors and televisions are not accepted at the landfill. Electronic waste is also not accepted at the RTSs or the County's semiannual HHW collection events.

Puhi Metals Recycling Center accepts eWaste free of charge. The program is open to residents and businesses with no restrictions on quantity and eWaste is accepted Monday through Saturday from 7:30 a.m. to 3:30 p.m., excluding County holidays. A list of accepted eWaste items can be found at www.kauai.gov/eWaste. Collected items are shipped off-island to end destination recyclers.⁶¹

Residents and businesses are also encouraged to donate electronics in usable condition to a non-profit agency for reuse. Other vendors that accept specific electronic items for recycling or repair are listed on the County's website.⁶²

The Hawai'i Electronic Device and Television Recycling Law (HRS Section 339D) was established in 2008 and states that manufacturers of televisions, computers, computer printers, computer monitors, and portable computers must operate recycling programs. Under this program, manufacturers that sell eWaste in Hawai'i are required to register with the HDOH and pay a fee. The fees are used to administer programs in each County. This Extended Producer Responsibility (EPR) legislation has had a very positive impact on the availability of affordable eWaste recycling on Kaua'i. The County receives an annual grant from the State to promote the program.

The County promotes proper collection of eWaste through the eWaste collection contests at schools. Students participate in the contests by bringing eWaste from home or identifying eWaste at school.

For the final quarter of FY 2019 (April through June 2019) through most of FY 2020 (July 2019 through February 2020), monthly mobile eWaste collection took place on the west side at the Hanapēpē County base yard on the last Saturday of the month and on the north shore at the Anaina Hou Community Park on the last Sunday of the month. Despite intensive promotions, customer turn-out and overall volumes were extremely low. Due to the low attendance, the cost effectiveness of the program was an issue and the County canceled the program.

Overall, the eWaste recycling on Kaua'i is very effective as seen in the 2016 Waste Characterization Study of the Kekaha Landfill (as summarized in Section 2). Less than 1 percent of the total waste sent to the landfill was recyclable eWaste. It should be noted that recorded tonnages from periodic events was higher than the current 6-day-a-week collection. Potential reasons for this could be that public do not feel an urge to recycle because the program is more available, so material is stockpiled until it is convenient to recycle a load. Also, light-weighting of consumer electronics is a significant factor in reduced eWaste recycling tonnages. Most televisions and computers are a fraction of the weight of what they used to be. Households are moving away from desktop computers in favor of iPads, smartphones, and other handheld devices to handle the work that a home computer was tasked with in the past.⁶³

1.9 Public Education

The County's public education efforts focus on raising public awareness of existing programs, resources, and regulations that promote waste management, source reduction, and recycling practices on Kaua'i. The County currently employs one recycling coordinator and a solid waste programs coordinator to manage the County's recycling program. These positions are responsible for implementing the majority of the County's public outreach and education initiatives on waste management, source reduction, and

⁶¹ County of Kaua'i. n.d. Electronics Recycling. <https://www.kauai.gov/eWaste>.

⁶² County of Kaua'i. n.d. Electronics Recycling. <https://www.kauai.gov/eWaste>.

⁶³ Quantities from "Kaua'i Waste Composition_2019.xlsx"

recycling practices. Additional discussion regarding the County's existing public education programs is presented in the following subsections.

1.9.1 County Website

The cornerstone of the public education program is the County's website.⁶⁴ County staff are responsible for designing and updating web pages containing waste management, source reduction, and recycling information. The website provides information describing different solid waste management programs available, information on waste and recycling disposal options, and provides printable educational material for the public. The website is updated frequently based on program changes and monthly reports that tell the County what information is accessed most frequently. In addition to the County website, the County Public Information Office provides promotion of recycling opportunities on their Facebook page.

1.9.2 Direct Engagement

The County provides multiple avenues through which Kaua'i residents and businesses can contact the recycling coordinator and other County staff directly for information regarding County programs. These include the following:

- The County Recycling Telephone Line – Multiple County staff have the line ring to phones and are available to answer questions on all waste diversion topics during office hours.
- Public Drop-Ins – County staff meet with the public upon request to discuss their experiences/issues/concerns/ideas regarding recycling.
- Facility Tours – County staff host tours of the KRC and landfill for school groups, community organizations, trade associations, and legislative bodies.
- Public Presentations – County staff make presentations to trade associations, youth groups, non-profit organizations, businesses, and other groups upon request.
- Information Booths – County staff provide information booths at large community events, such as the Kaua'i County Fair and Garden Fair.

1.9.3 Radio

The County recognizes that local radio stations are very well listened to on Kaua'i and offer the opportunity for exposure and education. County staff participate in local radio shows upon request. The County raises awareness of its recycling programs on the local radio stations through public service announcements and radio promotions on a regular basis, especially to promote periodic events.

1.9.4 Print Media

Printed material is essential to promoting a successful media-based program. The County promotes their programs through print advertisements in local newspapers and magazines and news releases through the County Public Information Office to inform the public regarding County programs. Occasionally, local media interest in news releases will result in an article in the local newspaper.

1.9.5 Brochures, Signs, and Other Printed Material

The County self-publishes the Kaua'i Recycling Guide, which is a small 22-page booklet highlighting all of the waste diversion and recycling programs. The guide requires frequent updating because programs change on a regular basis. The Kaua'i Recycling Guide is distributed to HI5 redemption centers, RTSs, the KRC, and libraries and at the County Fair, during school presentations, and upon request. The guide is an inexpensive way to provide information on variety of programs.

⁶⁴ County of Kaua'i. n.d. Division of Solid Waste. <https://www.kauai.gov/PublicWorks/SolidWaste>.

Brochures, signage, and other such printed material for individual distribution can be successful if created as a useful information sheet that the public can refer to for help (for example, to hang on the refrigerator at home or on the bulletin board at work). The County develops printable materials (and distributes hardcopies if needed) such as brochures, image-based signs, posters, stickers for recycling bins, and other printed material that convey messaging on how to and what to recycle.

1.9.6 Questionnaires

Questionnaires, both written and verbal, provide important benchmark input from the public. The County conducts web-based surveys on home composting, targeting residents who take advantage of the free Earth Machine home composting bins provided by the County. Surveys have also been used at the County Fair to assess public knowledge of various issues in solid waste management.

1.9.7 Workshops, Meetings, and Public Events

Workshops, meetings, fairs, and other public events create the opportunity for promoting new aspects of the County's waste reduction, recycling, and composting programs. The County provides information booths at large events such as the Kaua'i County Fair and Garden Fair.

1.9.8 Visitor Industry Participation

The visitor industry plays a vital role in the success of any waste reduction and resource recovery program, not only through their own aggressive programs but by providing recycling options for visitors to the island. Many hotels on Kaua'i provide in-room recycling containers to allow visitors to conveniently recycle. The County recycling office has limited interaction with the visitor industry at this time, but assists with free waste assessments and technical assistance upon request.

1.9.9 School Participation

Working with state and local schools can provide and successful educational opportunities. The County provides tours of the landfill to school groups upon request, provides HI5 recycling bins to schools to promote recycling, provides classroom presentations upon request, and coordinates school contests such as the School Electronic Waste Recycling Contest.

1.9.10 County Employees and Programs

The County employs workers as leaders in the community who create and implement solutions for Kaua'i. County employees have recycling opportunities available to them in their offices and the Līhu'e Civic Center, Police Headquarters, Office of Emergency Management, and Council Services. HI5 bins are provided for agency breakrooms, and the redemption of the material is decided by each agency. In some offices, the HI5 containers are donated to the janitor, while in others the staff redeem the material for an office kitty, sports team donations, or other purposes. Mixed paper recycling collection is available inside the offices and bins for non-HI5 recyclables are available for agency breakrooms. The County provides outdoor drop bins at the Civic Center for glass, plastic, and metal generated in breakrooms. Employees must transport these materials from their offices to the outdoor drop bins. Cardboard bins are available at the Civic Center and Police Headquarters and are widely used to recycle shipping supplies.

1.10 Refuse Transfer Stations

Table 1-7 presents the total tons of MSW received at each RTS in FY 2019.⁶⁵

Table 1-7. Kaua'i RTSs and FY 2019 Tonnage

Hanapēpē	Līhu'e	Kapa'a	Hanalei	Total
7,956	15,572	9,158	6,561	39,247

The main purpose of the RTSs is to accept MSW from the residential collection trucks and transfer it to the landfill. However, the RTSs receive a good amount of traffic from residents and small businesses. Approximately 8 percent of residents do not pay the collection fee for PAYT and the program's base fee covers free trips to the RTSs. Residents also use the RTSs to manage periodic cleanup activities including yard cleanup. The County accepts MSW, green waste, and specified recyclable materials from residents at the four RTSs free of charge. Accepted recyclable materials include tires, motor oil, scrap metal, appliances,⁶⁶ motor oil filters, and propane tanks. Residential recycling bins are offered at Hanalei RTS and Hanapēpē RTS. Bulky items, such as mattresses and furniture larger than 3 feet, are only accepted at Līhu'e RTS and the Kekaha Landfill.⁶⁷ Additional information on the green waste program is discussed in Section 1.6.2, Bioconversion.

Commercial businesses and other non-residential entities are required to pay to dispose of MSW and divert green waste at the County's RTSs. Because the RTSs do not have scales, non-residential customers pay to use the facilities by purchasing tipping fee coupons that are available for purchase at the Treasury Department desk located in the Department of Motor Vehicles building at the Civic Center. Non-residential status is determined by license plate – vehicles with commercial plates must use coupons to access the RTSs. Commercial vans, trailers and 3/4-ton-capacity trucks are limited to two loads per vehicle per day.⁶⁸ The coupon fees are as shown in Table 1-8. The fees are currently much lower than landfill tip fees for similar volumes.

Table 1-8. RTS Non-residential Coupon Fees

Type of Vehicle	Coupon Fee
Automobile	\$6.00
Pickup Truck – ½ ton and under	\$10.00
Full-size Pickup Truck – up to ¾ ton	\$20.00
Passenger Van	\$10.00
Cargo Van – up to ¾ ton	\$20.00
Small Trailer – ½ ton and under	\$10.00
Trailer – up to ¾ ton	\$20.00

Per County Ordinance 21-3.3, the following materials are not accepted at the RTSs:

- Ash.
- Bulky items and C&D greater than 3 feet in any dimension (excluding items taken to Līhu'e RTS by residential self-haulers).

⁶⁵ County of Kaua'i. 2019. Landfill Origin Summary for FY2019.pdf

⁶⁶ Līhu'e RTS does not accept appliances. Residents can drop them off free of charge at Puhi Metals Recycling Center.

⁶⁷ County of Kaua'i. 2020. Refuse Transfer Stations. <https://www.kauai.gov/TransferStations>.

⁶⁸ County of Kaua'i. 2020. Refuse Transfer Stations. <https://www.kauai.gov/TransferStations>.

- Used motor vehicle and heavy equipment tires (excluding passenger vehicle tires from residential self-haulers).
- White goods (excluding white goods from residential self-haulers).
- Animal carcasses, parts, or innards; liquid waste; medical waste which has not been sterilized; and large truck and heavy equipment tires.
- Explosives.
- Toxic and hazardous wastes.
- Pressurized containers (excluding propane cylinders from residential self-haulers).
- Corrugated cardboard from businesses, industrial, governmental, institutional, and other non-residential sources that exceed 10 percent of the load, by volume.
- Ferrous and non-ferrous metal items from non-residential sources that exceed 10 percent of the load, by volume.
- Monitors (CRTs and LCDs) from non-residential sources.

The County RTS hours of operation are 7:15 a.m. to 3:15 p.m., 7 days per week, excluding State holidays.⁶⁹ The Līhu'e and Hanalei RTSs are staffed by two- to three-person crews, the Hanapēpē RTS is staffed by three- to four-person crews, and the Kapa'a RTS is staffed by four- to five-person crews. The crews work five 8-hour days per week.⁷⁰

The County is in the process of implementing the following improvements at the RTSs:

- Installing separate top-loading drop-off locations for green waste at Hanalei and Kapa'a RTSs to eliminate double handling.
- Redesigning the RTSs to improve traffic flow and achieve more separation of loading areas for MSW, green waste, and bulky items.
- Replacing employee office and support buildings at Hanalei, Hanapēpē, and Kapa'a RTSs.
- Adding a paved surface for green waste loading at Hanapēpē RTS.
- Improving storm water collection at all RTSs.
- Covering and paving RTS drop-off areas for MSW, tires, propane tanks, scrap metal, and white goods.
- Upgrading Hanalei and Kapa'a RTSs to replace compactor loading with open-top trailer loading.

1.11 Kekaha Municipal Solid Waste Landfill

The Kekaha Landfill is owned and operated by the County. Prior to December 2019, landfill operations and monitoring services were contracted to Waste Management Hawai'i (WMH). The landfill's hours of operation are 8 a.m. to 12 p.m. and 12:30 p.m. to 4 p.m., 7 days per week, excluding State holidays.⁷¹

Table 1-9 shows the quantity of various waste streams received at the landfill during FY 2019.⁷² Per the solid waste management permit renewal and modification issued by the HDOH in September 2019, the peak daily disposal rate will not exceed 600 tons per day. In FY 2019, disposal at the landfill averaged 252 tons per day.

⁶⁹ Green waste is only accepted between 8 a.m. and 3 p.m. at Hanalei RTS.

⁷⁰ Information provided by County of Kaua'i staff. September 18, 2019.

⁷¹ County of Kaua'i. 2020. Kekaha Landfill Information. <https://www.kauai.gov/Landfill>.

⁷² Information provided by County of Kaua'i staff. September 9, 2019.

Table 1-9. County of Kaua'i Landfill Disposed Waste Streams FY 2019

Material	Quantity (tons)
Mixed Rubbish	72,252
Mixed C&D	13,093
Contaminated Cardboard	70
Sewage Sludge/Grit/Sand	4,318
Asbestos	29
Dead Animals	2
Contaminated Soils	998
Solidified Grease	279
Medical Waste	25
Total	91,066

In 2016, Cascadia Consulting Group (Cascadia) conducted a composition study of the mixed waste stream to identify materials that have the potential for landfill diversion. The results of this study are discussed in Section 2.

In September 2019, the landfill received approval from the HDOH for a 6.6-acre lateral expansion of the existing Phase II. Per the Kekaha Landfill 2020 Annual Operating Report,⁷³ the remaining Kekaha Landfill Phase II permitted airspace was 619,067 cubic yards as of June 27, 2020. The report estimates that the landfill would reach capacity in June 2027, which is approximately 6.5 years from January 2021.⁷⁴

The current tipping fees paid by the private haulers and other commercial vehicles at the landfill are shown in Table 1-10 (County Ordinance 21-9.2).

Table 1-10. Commercial Tipping Fees

Type of Waste	Dollars per Ton
MSW (except special wastes)	\$119.00
Asbestos-containing materials	\$218.00
Dead animals	\$119.00

The County accepts self-haul MSW, green waste, and specified recyclable materials from residents free of charge.

Should the vehicle scale at the landfill be inoperable, the County has in place a schedule of tipping fees by volume for commercial businesses and other non-residential vehicles (Table 1-11).

⁷³ Geosyntec Consultants. 2020. *Kekaha Municipal Solid Waste Landfill and Kekaha Materials Drop-Off Facility Annual Operating Report July 1, 2019 through June 30, 2020*.

⁷⁴ Information provided by County of Kaua'i staff. January 28, 2020.

Table 1-11. Commercial Tipping Fees with Inoperable Vehicle Scale

Type of Waste	Dollars per Cubic Yard
Un-compacted MSW, except special wastes (assumed 350 pounds/cubic year)	\$21.00
Compacted MSW, except special wastes (assumed 600 pounds/cubic yard)	\$36.00
Asbestos-containing materials	\$98.00
Dead animals	\$36.00

The minimum tipping fee charge for any load of MSW or dead animals is 21 dollars. The minimum tipping fee for any load of asbestos-containing material is 218 dollars. Per County Ordinance 21-7.3, the following materials are not accepted at the landfill:

- Corrugated cardboard from business, industrial, governmental, institutional, and other non-residential sources that exceeds 10 percent of the load, by volume.
- Ferrous and non-ferrous metal objects from non-residential sources that exceeds 10 percent of the load, by volume.
- Green waste from non-residential sources that exceeds 10 percent of the load, by volume.
- Liquid waste, except small quantities of liquids from residential sources in containers of types and sizes typically used in residential environments.
- Medical waste that has not been rendered non-infectious through sterilization.
- Motor vehicles and automotive-type batteries.
- Toxic and hazardous wastes.
- Used motor vehicle and heavy equipment tires (excluding passenger vehicle tires from residential self-haulers).
- White goods (excluding white goods from residential self-haulers).
- Frozen, raw or uncooked loads of crustaceans, including but not limited to shrimp and prawns from non-residential sources.
- Monitors (CRTs and LCDs) from non-residential sources.

1.12 Business, Non-profit, and Government Agency Use of Residential Programs

To support Kaua'i's residents, the Solid Waste Division provides free disposal and convenient drop-off for all programs aimed at residential use. There is a concern that many businesses, non-profits, and non-County government agencies abuse these programs by dropping off large volumes of material that should be managed by these entities. The costs to manage the residential programs are significant. If the abusing businesses were to pay their share of the processing costs the County could expand services in other areas or invest more in infrastructure to reduce long-term costs.

Signage is posted for each program, and attendants do speak with suspected non-residential customers to discuss the source of material. However, if the person is coming in with non-commercial plates or other identifying markings, the County is unable to turn away the loads.

The County will continue to educate staff and customers on eligible users and uses of the facility. Design upgrades to the County RTSs may increase visibility for attendants to see incoming loads as well as allow for clearer direction for residential and commercial loads.

2. Solid Waste Generation and Composition

2.1 Planning Period

The planning period for this ISWMP is from FY 2021 through 2030, with 2019 being the baseline year (that is, the existing conditions) and FY 2021 being the first year of plan implementation. FY 2019 was the most recent year with complete data on the existing solid waste management system when the County began preparing the Plan.

2.2 Population Projections

The size of the population is one important factor that influences the amount of waste generated in a geographic area: the greater the population, the greater the generated solid waste. Economic growth, income levels, and construction activity are other factors that affect solid waste generation. COVID-19 has resulted in a dramatic reduction in tourism in early 2020 and it is expected that tourism on the island will continue to be affected for several years as a result. It is likely that COVID-19 will have additional impacts on solid waste generation. These changes are not yet understood. Projections included in this Plan were calculated prior to COVID-19. Once new data are better available, the County may consider updating their 20-year projections.

In 2018, the Kaua'i County Planning Department (Planning Department) completed a 20-year Kaua'i County General Plan (2018 General Plan)⁷⁵ that presents the County's 20-year vision and sets policies for achieving that vision. De facto population projections from that plan are used as the basis for the projections in this section. De facto population is defined as the number of people physically present in an area, regardless of military status or usual place of residence. It includes visitors, such as tourists, but excludes residents temporarily absent, both calculated as an average daily census. Because of the large number of visitors to the County and their impact on the waste generated, it is important to include them when determining population and amounts of waste generated.

Table 2-1 shows the historical and forecast resident population, average daily visitors, and de facto population through 2035. During the 2021 to 2030 planning period, forecast average annual growth rates are 1.6 percent for the resident population, 2.7 percent for daily visitors, and 1.9 percent for the de facto population.

Table 2-1. De Facto Population Projections for Kaua'i County

Year	Resident Population	Average Daily Visitors	Total Daily De Facto Population
2010	67,091	19,548	86,639
2015	70,717	24,533	95,250
2019	73,588	29,033	102,621
2020	74,693	29,614	104,307
2021	75,440	30,206	105,646
2022	76,194	30,810	107,004
2023	76,956	31,426	108,382
2024	77,726	32,055	109,780
2025	78,503	32,696	111,199

⁷⁵ County of Kaua'i Planning Department. 2018. Kaua'i County General Plan 2018. <http://plankauai.com/>.

Table 2-1. De Facto Population Projections for Kaua'i County

Year	Resident Population	Average Daily Visitors	Total Daily De Facto Population
2026	79,288	33,350	112,638
2027	80,081	34,017	114,098
2028	80,882	34,697	115,579
2029	81,691	35,391	117,082
2030	83,328	36,099	119,427
2035	88,013	39,480	127,493

Source: 2018 General Plan

2.3 Current Generation Quantities

Current (baseline) waste generation during FY 2019 in the County is the sum of waste disposed of at the Kekaha Landfill and material diverted county-wide. The tons diverted is a combination of FY 2019 residential data collected by the County and estimated commercial data. The commercial diversion estimate is based on FY 2016 data collected by the County projected to FY 2019 using the percent change in disposal from FY 2016 to FY 2019 (approximately 9 percent). As shown in Table 2-2, the total amount generated in FY 2019 was approximately 158,700 tons.

Table 2-2. Waste Generation, FY 2019

Management	Tons
Kekaha Landfill	91,066
Diverted	67,593
Total	158,659

Based on a generation quantity of 158,659 tons and a de facto population of 102,621, the per capita generation rate per day is 8.47 pound per capita per day, as follows.

$$\text{Generation Rate} = [(\text{waste generation}/\text{de facto population}) \times 2,000]/365$$

$$\text{Generation Rate} = [(158,659/102,621) \times 2000]/365$$

$$\text{Generation Rate} = 8.47 \text{ pounds/capita/day}$$

2.4 Waste Diversion Summary

As documented in Section 1, the County has been successful in establishing a variety of solid waste diversion programs. Table 2-3 summarizes the quantities of materials diverted from the landfill in FY 2019.

Table 2-3. Quantities Diverted from the Kekaha Landfill (in tons), FY 2019

Material	Tons
Cardboard	5,041
Mixed Paper	825
Plastic	1,677
Glass	1,642
Aluminum	264
Scrap Metal	5,186
Food Waste	3,280
Green Waste and Other Organics	28,784
Inerts and Other C&D	20,049
Electronics and Appliances	197
Household Hazardous Waste	132
Special Waste	516
Total	67,593

Note: Based on FY 2019 data collected by the County and some commercial recycling data estimated using FY 2016 increased by the change in the disposal rate from 2016 to 2019 (approximately 9 percent).

2.5 Future Generation Quantities

Table 2-4 presents projected tonnage for MSW and diversion through the study period. It should be noted that generated waste is based on forecasts of de facto population (Table 2-1), a constant rate of waste generation (generation/de facto population) of 8.47 pounds/capita/day, and a relatively stable diversion rate of 43 percent (based on the baseline FY 2019 diversion rate). To the extent the County residents and businesses are successful in adopting strategies to reduce and prevent waste from being generated, the tons of waste generated and disposed of will be less than that shown in Table 2-4.

Table 2-4. Projected MSW and Diverted Material Generation

Year	Total MSW Generated (tons) ^a	Total Diverted Material (tons) ^b	Total MSW Disposed (tons)
2019	158,659	67,593	91,066
2020	161,265	68,703	92,562
2021	163,335	69,586	93,750
2022	165,436	70,480	94,955
2023	167,566	71,388	96,178
2024	169,728	72,309	97,419
2025	171,921	73,243	98,678

Table 2-4. Projected MSW and Diverted Material Generation

Year	Total MSW Generated (tons) ^a	Total Diverted Material (tons) ^b	Total MSW Disposed (tons)
2026	174,146	74,191	99,955
2027	176,403	75,153	101,250
2028	178,693	76,128	102,564
2029	181,016	77,118	103,898
2030	184,642	78,663	105,979
2035	197,113	83,976	113,137

^a Based on a generation rate of 8.47 pounds per capita per day, 365 days per year, and the de facto population estimate provided in Table 2-1.

^b Based on the FY 2019 baseline diversion rate of 43% (tons recycled [67,593]/tons generated [158,659]). The diversion percentage is expected to increase as new enhancement opportunities, which are further described in this document, are implemented.

2.6 Waste Stream Characterization

To determine the best approaches to managing waste, it is important to understand the source and the type of waste to be managed. The County retained Cascadia to conduct a waste composition study to obtain information for use in developing planning estimates. These estimates are used in various sections of this Plan. The 2016 Waste Characterization Study provided an estimate of the composition and quantities of solid waste material disposed of at the Kekaha Landfill. To develop targeted programs, it is important to know the composition of waste delivered to each facility and the composition generated by each generator type. The County of Kaua'i Waste Characterization Study was conducted to provide this information. A summary of the methodology and results of the study is provided in the following sections.

2.6.1 Methodology

Cascadia characterized a total of 162 samples (81 samples from private commercial generators and 81 samples from the RTSs). Private commercial waste includes MSW and C&D materials from primarily institutional, commercial, or industrial sources that private hauling companies deliver to the Kekaha Landfill. RTS waste includes primarily residential MSW from County refuse collection trucks, individual residents, and small businesses that is delivered to one of the County's four RTSs or directly to the Kekaha Landfill.

The samples were taken in two seasons to capture differences in seasonal generation trends. The first season (high tourist season) took place in late July/early August 2016, and the second season (low tourist season) took place in late September/early October 2016. The field team hand-sorted all samples collected. Table 2-5 presents the number of samples taken from each substream.

Table 2-5. Waste Composition Sample Distribution by Substream

Substream	Number of Samples
Privately Hauled Commercial Waste Delivered to the Kekaha Landfill	81
Residential	81
▪ County-Hauled Waste Delivering Directly to the Kekaha Landfill	8
▪ Līhu'e RTS Material Delivered to the Kekaha Landfill	24

Table 2-5. Waste Composition Sample Distribution by Substream

Substream	Number of Samples
▪ Hanalei RTS Material Delivered to the Kekaha Landfill	16
▪ Kapa'a RTS Material Delivered to the Kekaha Landfill	16
▪ Hanapēpē RTS Material Delivered to the Kekaha Landfill	17
▪ Residential Hauled to the Kekaha Landfill	0
Total	162

Note: Data from FY 2016.

Source: Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

Composition data (percentages by weight) from these sorts were multiplied by annual quantity (tonnage) data provided by the County to generate the estimates presented in this section. Table 2-6 summarizes residential and commercial waste tonnages reported during FY 2016.

Table 2-6. Waste Composition Study Solid Waste Totals

Substream	FY 2016 Waste Tonnages
Privately Hauled Commercial Waste Delivered to the Kekaha Landfill	42,324
Residential	41,416
▪ County-Hauled Waste Delivering Directly to the Kekaha Landfill	938
▪ Līhu'e RTS Material Delivered to the Kekaha Landfill	17,079
▪ Hanalei RTS Material Delivered to the Kekaha Landfill	5,957
▪ Kapa'a RTS Material Delivered to the Kekaha Landfill	4,870
▪ Hanapēpē RTS Material Delivered to the Kekaha Landfill	9,350
▪ Residential Hauled to the Kekaha Landfill	3,222
Total	83,740

Note: Data from FY 2016.

Source: Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

2.6.2 Solid Waste Composition

The overall FY 2016 disposed waste composition is provided on Figure 2-1. As the figure shows, 23.7 percent of the County's waste stream is made up of Inerts and Other C&D, which is the largest portion of the disposed waste stream. Paper (18.4 percent), Other Organics (18.0 percent), Plastic (11.5 percent), and Food (10.3 percent) also make up significant portions of the overall disposed waste stream.⁷⁶

⁷⁶ Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

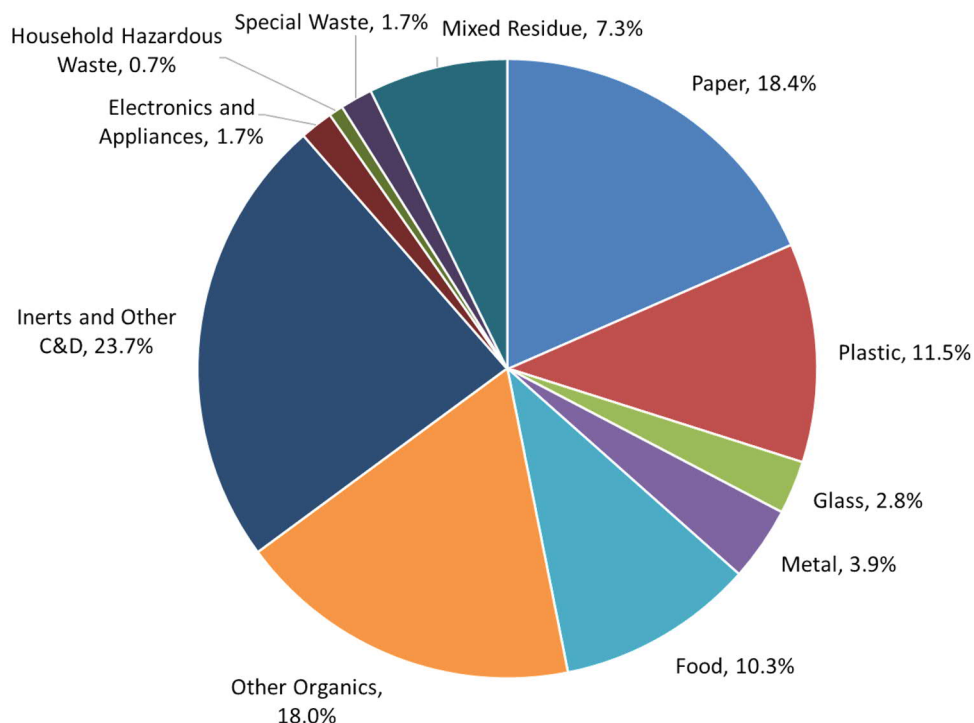


Figure 2-1. Disposed Composition by Material Class, Overall Kaua'i County-wide Waste Composition (FY 2016)

A detailed composition of the overall County disposed waste stream is provided in Table 2-7, which provides data about percent composition and tonnage by material class and type for the County of Kaua'i overall waste stream. The tonnages were derived by multiplying the FY 2016 tonnage disposed of at the Kekaha Landfill (83,740 tons) by the composition percentage.⁷⁷

Figure 2-2 shows disposed residential and commercial waste composition graphically. Table 2-7 presents a detailed disposed waste composition, with substreams shown for under each material class. Table 2-8 presents disposed waste composition data for residential and commercial customers, and in total.

Table 2-7. Detailed Disposed Waste Composition, Overall Kaua'i County-wide (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	18.4%	15,441	Other Organics	18.0%	15,107
Uncoated Corrugated Cardboard	4.4%	3,674	Leaves and Grass	4.3%	3,579
Kraft Paper Bags	1.4%	1,149	Prunings and Trimmings	1.9%	1,585
Newspaper	0.8%	629	Branches and Stumps	0.1%	64
White Ledger Paper	1.3%	1,096	Manures	0.0%	0
Mixed Paper	4.1%	3,472	Textiles	3.0%	2,525
Aseptic and Gable Top Containers	0.4%	323	Carpet	0.6%	508
Compostable Paper	4.4%	3,711	Sewage Sludge	4.8%	3,985
Non-Recyclable Paper	1.7%	1,386	Non-Recyclable Organic	3.4%	2,861

⁷⁷ Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

Table 2-7. Detailed Disposed Waste Composition, Overall Kaua'i County-wide (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Plastic	11.5%	9,595	Inerts and Other C&D	23.7%	19,815
PETE Containers – HI5	0.4%	375	Concrete	1.3%	1,072
PETE Containers – Non-HI5	0.3%	246	Asphalt Paving	0.0%	3
HDPE Containers – HI5	0.1%	122	Asphalt Roofing	1.9%	1,566
HDPE Containers – Non-HI5	0.5%	430	Clean Lumber	5.0%	4,167
Plastic Containers #3-#7	1.1%	958	Treated Lumber	2.9%	2,467
Plastic Grocery and Other Merchandise Bags	0.0%	41	Other Wood Waste	6.2%	5,157
Agricultural Film Plastic	0.1%	80	Gypsum Board	3.4%	2,821
Other Clean Film	0.5%	385	Rock, Soil and Fines	1.7%	1,395
Non-Recyclable Film Plastic	4.1%	3,407	Non-Recyclable Inerts and Other	1.4%	1,166
Durable Plastic Items	1.9%	1,605			
Expanded Polystyrene Food Serveware	0.4%	364	Electronics and Appliances	1.7%	1,446
Other Expanded Polystyrene	0.3%	236	Covered Electronic Devices	0.2%	138
Non-Recyclable Plastic	1.6%	1,345	Non-Covered Electronic Devices	0.5%	387
			Major Appliances	0.0%	0
Glass	2.8%	2,332	Small Appliances	1.1%	921
Glass Bottles and Containers – HI5	0.9%	761			
Glass Bottles and Containers – Non-HI5	1.3%	1,083	HHW	0.7%	626
Non-Recyclable Glass	0.6%	488	Paint	0.0%	38
			Empty Aerosol Containers	0.1%	70
Metal	3.9%	3,240	Vehicle and Equipment Fluids	0.0%	0
Tin/Steel Cans	0.5%	438	Used Oil	0.0%	2
Bi-Metal Cans HI5	0.1%	69	Batteries	0.1%	109
Other Ferrous	1.3%	1,060	Mercury-Containing Items – Not Lamps	0.0%	0
Aluminum Cans – HI5	0.3%	228	Lamps – Fluorescent and LED	0.0%	8
Aluminum Cans – Non-HI5	0.1%	78	Remainder/Composite Household Hazardous	0.5%	399
Other Non-Ferrous	0.6%	530			

Table 2-7. Detailed Disposed Waste Composition, Overall Kaua'i County-wide (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Remainder/Composite Metal	1.0%	838	Special Waste	1.7%	1,415
			Ash	0.2%	130
Food	10.3%	8,635	Treated Medical Waste	0.0%	4
Retail Packaged Food – Meat	0.5%	432	Bulky Items	0.4%	335
Retail Packaged Food – Non-Meat	2.8%	2,361	Tires	0.0%	9
Unpackaged Food – Meat	0.9%	787	Remainder/Composite Special Waste	1.1%	937
Other Packaged Food – Meat	0.6%	522			
Unpackaged Food – Non-Meat	4.3%	3,597	Mixed Residue	7.3%	6,089
Other Packaged Food – Non-Meat	1.1%	936	Mixed Residue	7.3%	6,089
			Totals	100.0%	83,740
			Samples	162	

Note: Percentages for material types may not total 100% due to rounding.

Source: Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

Table 2-8. Disposed Waste Composition by Material Class, Residential, Commercial, and Total (FY 2016)

Material	Residential		Commercial		Total	
	Tons	% of Total	Tons	% of Total	Tons	% of Total
Paper	7,533	18%	7,908	19%	15,441	18%
Plastic	4,584	11%	5,010	12%	9,595	11%
Glass	1,165	3%	1,167	3%	2,332	3%
Metal	1,624	4%	1,616	4%	3,240	4%
Food	4,104	10%	4,531	11%	8,635	10%
Other Organics	7,846	19%	7,262	17%	15,107	18%
Inerts and Other C&D	8,986	22%	10,829	26%	19,815	24%
Electronics and Appliances	1,066	3%	380	1%	1,446	2%
Household Hazardous Waste	338	1%	288	1%	626	1%
Special Waste	172	0.4%	1,243	3%	1,415	2%
Mixed Residue	3,998	10%	2,091	5%	6,089	7%
Total	41,416	100%	42,325	100%	83,741	100%

Note: Data from FY 2016.

Source: Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

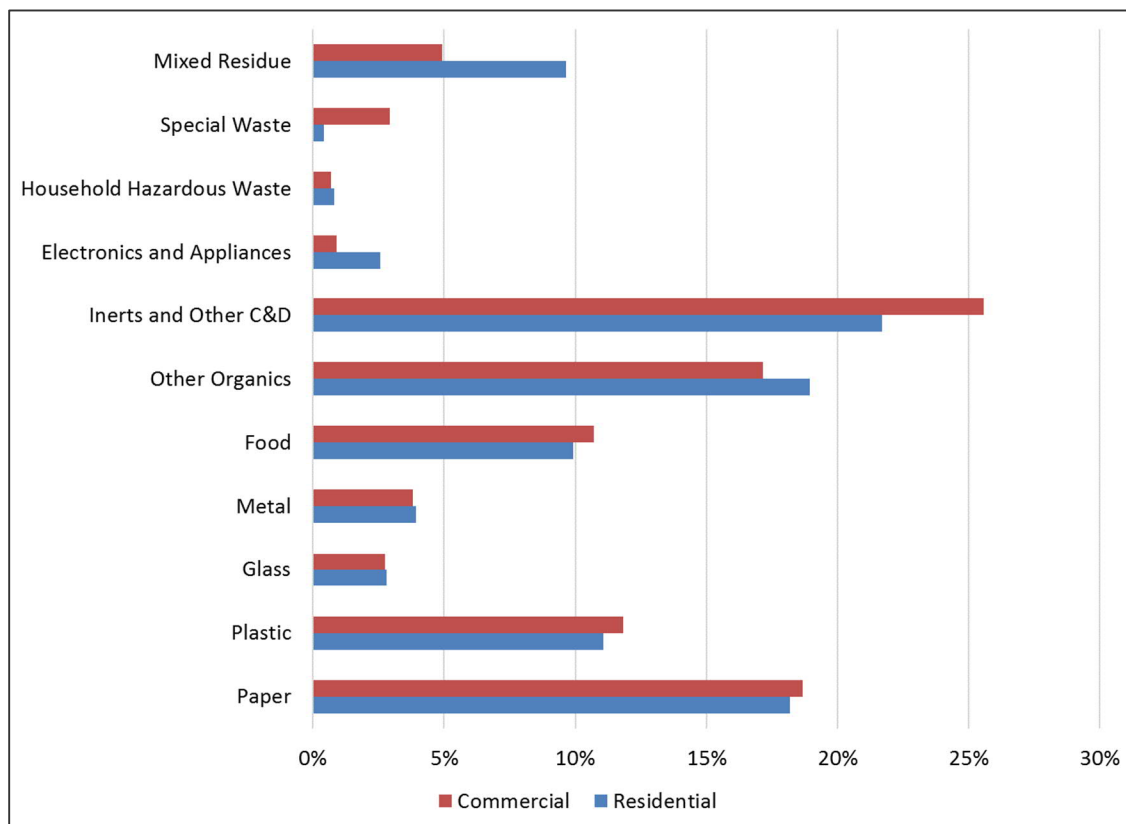


Figure 2-2. Disposed Residential and Commercial Waste Composition (FY 2016)

As shown in Table 2-8 and on Figure 2-2, Inerts and Other C&D, Organics (both food and other organics), and Paper are the largest components of the disposed waste stream. Organics and Paper provide the largest opportunity for diversion; from both the commercial and residential sector.

The composition of the commercial and residential waste streams is provided in Table 2-9 and Table 2-10, respectively. Table 2-9 provides data about percent composition by material class and type, as well as tonnage estimates by material class and type, for privately hauled commercial waste delivered to the Kekaha Landfill.

Table 2-10 provides data about percent composition by material class and type, as well as tonnage estimates by material class and type, for RTS wastes delivered to the Kekaha Landfill. The samples collected from this substream were selected from deliveries by County refuse collection trucks, individual residents, and small businesses to one of the County’s four RTSs and material delivered by County refuse collection trucks directly to the Kekaha Landfill. The majority of this material is from residential sources.

Table 2-9. Disposed Waste Composition, Private Commercial Waste (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	18.7%	7,908	Other Organics	17.2%	7,262
Uncoated Corrugated Cardboard	4.3%	1,834	Leaves and Grass	1.4%	610
Kraft Paper Bags	1.4%	572	Prunings and Trimmings	1.5%	629
Newspaper	0.6%	271	Branches and Stumps	0.1%	37
White Ledger Paper	1.7%	702	Manures	0.0%	0

Table 2-9. Disposed Waste Composition, Private Commercial Waste (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Mixed Paper	4.0%	1,699	Textiles	1.7%	716
Aseptic and Gable Top Containers	0.5%	193	Carpet	0.2%	99
Compostable Paper	4.5%	1,925	Sewage Sludge	9.4%	3,985
Non-Recyclable Paper	1.7%	712	Non-Recyclable Organic	2.8%	1,187
Plastic	11.8%	5,010	Inerts and Other C&D	25.6%	10,829
PETE Containers – HI5	0.5%	221	Concrete	0.4%	152
PETE Containers – Non-HI5	0.3%	117	Asphalt Paving	0.0%	3
HDPE Containers – HI5	0.1%	59	Asphalt Roofing	1.3%	536
HDPE Containers – Non-HI5	0.5%	193	Clean Lumber	6.9%	2,899
Plastic Containers #3-#7	1.2%	502	Treated Lumber	2.9%	1,212
Plastic Grocery and Other Merchandise Bags	0.1%	27	Other Wood Waste	7.0%	2,943
Agricultural Film Plastic	0.1%	61	Gypsum Board	5.2%	2,204
Other Clean Film	0.8%	319	Rock, Soil and Fines	0.4%	184
Non-Recyclable Film Plastic	3.7%	1,576	Non-Recyclable Inerts and Other	1.6%	695
Durable Plastic Items	2.3%	957			
Expanded Polystyrene Food Serviceware	0.3%	134	Electronics and Appliances	0.9%	380
Other Expanded Polystyrene	0.4%	166	Covered Electronic Devices	0.2%	65
Non-Recyclable Plastic	1.6%	678	Non-Covered Electronic Devices	0.1%	62
			Major Appliances	0.0%	0
Glass	2.8%	1,167	Small Appliances	0.6%	253
Glass Bottles and Containers – HI5	0.9%	378			
Glass Bottles and Containers – Non-HI5	1.4%	591	HHW	0.7%	288
Non-Recyclable Glass	0.5%	198	Paint	0.0%	5
			Empty Aerosol Containers	0.1%	33
Metal	3.8%	1,616	Vehicle and Equipment Fluids	0.0%	0
Tin/Steel Cans	0.4%	157	Used Oil	0.0%	0
Bi-Metal Cans HI5	0.1%	33	Batteries	0.0%	14
Other Ferrous	1.1%	476	Mercury-Containing Items – Not Lamps	0.0%	0

Table 2-9. Disposed Waste Composition, Private Commercial Waste (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Aluminum Cans – HI5	0.2%	102	Lamps – Fluorescent and LED	0.0%	1
Aluminum Cans – Non-HI5	0.1%	24	Remainder/Composite Household Hazardous	0.6%	235
Other Non-Ferrous	0.7%	311			
Remainder/Composite Metal	1.2%	514	Special Waste	2.9%	1,243
			Ash	0.0%	0
Food	10.7%	4,531	Treated Medical Waste	0.0%	0
Retail Packaged Food – Meat	0.3%	145	Bulky Items	0.7%	300
Retail Packaged Food – Non-Meat	2.8%	1,184	Tires	0.0%	5
Unpackaged Food – Meat	1.2%	499	Remainder/Composite Special Waste	2.2%	937
Other Packaged Food – Meat	0.5%	224			
Unpackaged Food – Non-Meat	5.0%	2,096	Mixed Residue	4.9%	2,091
Other Packaged Food – Non-Meat	0.9%	382	Mixed Residue	4.9%	2,091
			Totals	100.0%	42,324
			Samples	81	

Note: Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Source: Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

Table 2-10. Disposed Waste Composition, County RTS (Residential) Waste (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Paper	18.2%	7,533	Other Organics	18.9%	7,846
Uncoated Corrugated Cardboard	4.4%	1,840	Leaves and Grass	7.2%	2,970
Kraft Paper Bags	1.4%	577	Prunings and Trimmings	2.3%	956
Newspaper	0.9%	358	Branches and Stumps	0.1%	27
White Ledger Paper	1.0%	395	Manures	0.0%	0
Mixed Paper	4.3%	1,773	Textiles	4.4%	1,810
Aseptic and Gable Top Containers	0.3%	130	Carpet	1.0%	408
Compostable Paper	4.3%	1,787	Sewage Sludge	0.0%	0
Non-Recyclable Paper	1.6%	673	Non-Recyclable Organic	4.0%	1,675
Plastic	11.1%	4,584	Inerts and Other C&D	21.7%	8,986
PETE Containers – HI5	0.4%	155	Concrete	2.2%	920

Table 2-10. Disposed Waste Composition, County RTS (Residential) Waste (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
PETE Containers – Non-HI5	0.3%	128	Asphalt Paving	0.0%	0
HDPE Containers – HI5	0.2%	63	Asphalt Roofing	2.5%	1,029
HDPE Containers – Non-HI5	0.6%	237	Clean Lumber	3.1%	1,268
Plastic Containers #3-#7	1.1%	456	Treated Lumber	3.0%	1,256
Plastic Grocery and Other Merchandise Bags	0.0%	14	Other Wood Waste	5.3%	2,214
Agricultural Film Plastic	0.0%	19	Gypsum Board	1.5%	617
Other Clean Film	0.2%	66	Rock, Soil and Fines	2.9%	1,211
Non-Recyclable Film Plastic	4.4%	1,831	Non-Recyclable Inerts and Other	1.1%	471
Durable Plastic Items	1.6%	649			
Expanded Polystyrene Food Serviceware	0.6%	230	Electronics and Appliances	2.6%	1,066
Other Expanded Polystyrene	0.2%	70	Covered Electronic Devices	0.2%	74
Non-Recyclable Plastic	1.6%	667	Non-Covered Electronic Devices	0.8%	324
			Major Appliances	0.0%	0
Glass	2.8%	1,165	Small Appliances	1.6%	668
Glass Bottles and Containers – HI5	0.9%	383			
Glass Bottles and Containers – Non-HI5	1.2%	492	HHW	0.8%	338
Non-Recyclable Glass	0.7%	290	Paint	0.1%	33
			Empty Aerosol Containers	0.1%	37
Metal	3.9%	1,624	Vehicle and Equipment Fluids	0.0%	0
Tin/Steel Cans	0.7%	281	Used Oil	0.0%	2
Bi-Metal Cans HI5	0.1%	36	Batteries	0.2%	96
Other Ferrous	1.4%	584	Mercury-Containing Items – Not Lamps	0.0%	0
Aluminum Cans – HI5	0.3%	126	Lamps – Fluorescent and LED	0.0%	7
Aluminum Cans – Non-HI5	0.1%	54	Remainder/Composite Household Hazardous	0.4%	164
Other Non-Ferrous	0.5%	218			
Remainder/Composite Metal	0.8%	325	Special Waste	0.4%	172
			Ash	0.3%	130
Food	9.9%	4,104	Treated Medical Waste	0.0%	4
Retail Packaged Food – Meat	0.7%	286	Bulky Items	0.1%	34

Table 2-10. Disposed Waste Composition, County RTS (Residential) Waste (FY 2016)

Material	Estimated Percent	Estimated Tons	Material	Estimated Percent	Estimated Tons
Retail Packaged Food – Non-Meat	2.8%	1,177	Tires	0.0%	3
Unpackaged Food – Meat	0.7%	287	Remainder/Composite Special Waste	0.0%	0
Other Packaged Food – Meat	0.7%	298			
Unpackaged Food – Non-Meat	3.6%	1,501	Mixed Residue	9.7%	3,998
Other Packaged Food – Non-Meat	1.3%	554	Mixed Residue	9.7%	3,998
Totals				100.0%	41,416
Samples				81	

Note: Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Source: Cascadia. 2017. *Kaua'i County Waste Characterization Study Report 2017*. May.

Table 2-11 presents a summary composition of generation, diversion, and disposal by material for FY 2019. Organics (food waste and other organics such as green waste) make up the largest single component of the total waste stream, with about 57,883 tons being generated in FY 2019. Inerts and Other C&D is second, with approximately 41,597 tons, while Paper accounted for about 22,658 tons of total waste. In total, about 67,593 tons of material was diverted in FY 2019 for a total diversion rate of 43 percent.

Table 2-11. Generation, Diversion, and Disposal by Material (FY 2019)

Material	Tons Generated	Tons Diverted	Tons Disposed	Diversion Rate
Paper	22,658	5,866	16,792	26%
Plastic	12,111	1,677	10,434	14%
Glass	4,178	1,642	2,536	39%
Metal	8,973	5,450	3,523	61%
Food	12,671	3,280	9,390	26%
Other Organics	45,212	28,784	16,428	64%
Inerts and Other C&D	41,597	20,049	21,548	48%
Electronics and Appliances	1,769	197	1,572	11%
Household Hazardous Waste	813	132	681	16%
Special Waste	2,055	516	1,539	25%
Mixed Residue	6,622	-	6,622	0%
Total	158,659	67,593	91,066	43%

3. Source Reduction and Reuse

3.1 Purpose

The purpose of this section is to characterize the County's current source reduction and reuse efforts and provide recommendations to improve source reduction and increase waste diversion in the County. Existing programs and the level of reduction the County is achieving through these programs are summarized in Section 1. Additional information on diversion rates is provided in Section 2.

3.2 Background

Kaua'i County Code, Chapter 21, Integrated Solid Waste Management, defines source reduction as “*the design, manufacture and use of materials to:*

- 1) *Minimize the quantity or toxicity, or both, of the waste produced*
- 2) *Reduce the creation of waste either by redesigning products or by otherwise changing societal patterns of consumption, use, or waste generation*”

3.2.1 Legislative

Per HRS Section 342G-2, Integrated Solid Waste Management, each county shall consider the following solid waste management practices and processing methods in their order of priority:

- 1) Source reduction.
- 2) Recycling and bioconversion, including composting.
- 3) Landfilling and incineration.

Per the HDOH's Report to the Twenty-Third Legislature in December of 2005, source reduction:

“is also called “waste prevention” meaning creating less waste. “Reuse”, although not included in the list of priorities, means using a product over without first having to reprocess it. The product may be used for its original or intended use or may be used in a different capacity.”

Waste reduction is difficult to quantify because it avoids creation of waste in the first place. This chapter of the Plan will identify and evaluate specific measures for achieving source reduction, as outlined in HRS Section 342G-26, including the following:

- Increased efficiency in the use of all materials.
- Replacement of disposable materials and products with reusable materials and products.
- Reduced packaging.

Source reduction and reuse are also identified as key strategies for meeting the Aloha+ Challenge waste target and the diversion goals included in the 2018 General Plan. The Aloha+ Challenge is a statewide commitment endorsed by the Governor of Hawai'i and the Mayor of Kaua'i to achieve six interconnected sustainability goals for 2030, including a goal to reduce the solid waste stream prior to disposal by 70 percent through source reduction, recycling, bioconversion, and landfill diversion methods.⁷⁸ The State measures progress against goals on the Aloha+ Challenge Dashboard (<https://dashboard.hawaii.gov/aloha-challenge>). Quantities of material reused each year are tracked; however, source reduction quantities are not currently measured because of the many local and national data gaps in collection, monitoring, and evaluation in this area.^{79,80}

⁷⁸ State of Hawai'i. 2020. “The Aloha+ Challenge Dashboard”. <https://dashboard.hawaii.gov/aloha-challenge>.

⁷⁹ State of Hawai'i. 2020. “Reuse”. <https://dashboard.hawaii.gov/en/stat/goals/5xfh-begg/7rpz-qst3/eawq-rkvv>.

⁸⁰ State of Hawai'i. 2020. “Source Reduction”. <https://dashboard.hawaii.gov/en/stat/goals/5xfh-begg/7rpz-qst3/te7z-9zrq>.

As mentioned in Section 1, in 2011, the County adopted its own Zero Waste Resolution and 70 percent diversion goal by 2023 which is also included in the 2018 General Plan. The resolution promotes use of zero waste principles that are akin to source reduction and recycling. While the Zero Waste Resolution was a positive step, the Resolution was not combined with a plan or adequate funding needed to implement a Zero Waste Plan. In order to advance diversion and become a sustainable island, the County will need to dedicate the necessary funding, staffing, infrastructure, and legislation.

3.2.2 Current Source Reduction and Reuse Activities

Source reduction and reuse activities currently used by the County are summarized in Section 1 and include the following:

- Source reduction and reuse through thoughtful use of printing and scratch paper, reuse of envelopes internally, high use of electronic files, and grass-cycling in County agencies.
- Partnerships with thrift stores.
- Development and publication of the Kaua'i Recycling Guide, which includes information pertinent to source reduction.
- Spreading awareness through schools and community events.
- Offering free composting bins to residents.
- Providing businesses with technical assistance.
- Enforcing the Plastic Bag Reduction ordinance.
- Adopting the Zero Waste Ordinance.
- Passing and working towards policies for plastic and polystyrene reduction and compostables use.
- Implementing the PAYT system.

3.3 Enhancement Opportunities

This section provides opportunities the County will consider for enhancing the source reduction and reuse practices throughout the island. Implementation of these opportunities will be dependent on securing the required staff resources and funding.

3.3.1 Build Off and Expand Policies for Plastic and Polystyrene Reduction and Compostable Use

Opportunities exist to build off existing policies that are aimed at reducing the amount of single-use plastics used and disposed. Recent efforts (see Section 1.5.2.6 for details), including the plastic bag reduction ordinance (adopted by the Kaua'i County Council in 2009; effective beginning in 2011), the polystyrene ban (County Bill 2775, signed in September 2020 and to become effective in January 2022), and the County's Policy to Limit the Purchase, Use, or Distribution of Single Use Plastics on County Property (effective January 1, 2021). With completion of the polystyrene ban and County policy, the County is looking for ways to guide the types of materials that are used in place of polystyrene. Maui County initially banned expanded polystyrene only, but revised their ordinance to ban all plastic disposable food ware effective January 2022. Kaua'i County should assess the success of Maui's new legislation and consider following their lead.

3.3.2 Advocate for Extended Producer Responsibility for Potential Candidate Materials

EPR is a type of product stewardship that places the cost and responsibility of disposal (for the product and its packaging) on the manufacturer of the product, instead of the end user. This is an important source reduction tactic as placing the responsibility on the producer motivates the producer to consider human health and the environment in product design and lifecycle. EPR is typically driven at the state and federal level; however, the County can work with the State and the State Source Reduction Working

Group to advance EPR policy and legislation. The County would not be in a lead role but would comment and potentially testify as legislation was developed. This would require some additional staff time. Candidate materials identified for EPR include fluorescent tubes, paper, pallets, packaging, mattresses, and paint.

According to the Product Stewardship Institute, Inc., as of 2019, the number of state EPR laws (within a state) ranges from zero to nine (only in California). Only nine states have four or more EPR laws, with the vast majority having one or less. Hawai'i has one state EPR law regarding covered electronic devices.⁸¹ Additional state-level EPR laws in Hawai'i would likely face opposition by retailers, who have been reluctant to implement EPR because of the additional costs of doing business in Hawai'i.

Some big box stores already accept some products. In Kaua'i, Home Depot collects CFLs.

3.3.3 Offer Grant-in-Aid Funding to Support Food Waste to Animal Feed Projects

The County has a well-established Grant-in-Aid program through the Department of Finance and has previously offered recycling and waste diversion grants to local organizations. To promote reduction and diversion of food waste, the County can offer Grant-in-Aid funding for food waste to animal feed projects on-island. Feeding animals is the third tier in the EPA's Food Waste Hierarchy for beneficial use of food, following reduction of surplus food and feeding hungry people.⁸² Local pig farmers currently collect food waste from local hotels, restaurants, and the County jail to use as feedstock.

Unfortunately, larger pig farms have started to close, and without an alternative Food Waste to Animal Feed option, the potential of this important source reduction method will not be fully realized. There may be opportunities to supplement the existing Food Waste to Animal Feed activities by exploring other operations that could accept a portion of the food waste and use it for animal feed. If a viable alternative is found, it may be beneficial to collaborate with the County to find potential generators of food waste, such as schools, slaughterhouses, and fishermen that could supply this new Food Waste to Animal Feed program.

3.3.4 Recognize and Promote the Lodging Industry's Source Reduction Efforts

Several lodging companies have been taking steps toward source reduction on their lodging properties. For example, Hyatt Po'ipū has installed water bottle refilling stations and gives plastic refillable bottles to guests instead of single-use plastic bottles. Other hotel chains are transitioning away from single-use plastic toiletries and toward refillable dispensers. The County will recognize and promote source reduction activities in the lodging industry on its website and use this as an opportunity to share best practices for waste prevention, source reduction, reuse, recycling, and solid waste management with other sectors/businesses. In addition, the County will actively promote consistent image-based signage on recycling containers at resorts. This will require some additional time.

3.3.5 Support State Plastics Source Reduction Working Group Findings Related to Use of Reusable Containers at Restaurants

The State Plastics Source Reduction Working Group is tasked with developing a report that lists viable options for plastics reduction. One major area of plastics prevalence is take-out/to-go containers at restaurants and a potential solution is to reduce single-use containers by allowing and/or providing reusable containers. The County will use the findings from the State Plastics Source Reduction Working Group, with respect to reusable containers at restaurants, and will communicate these findings and/or evaluate future associated actions to carry-out those findings in the County. This is the first step of a potential future program. Future involvement by the County will be dependent on the findings.

⁸¹ Product Stewardship Institute. 2020. "U.S. State EPR Laws". https://www.productstewardship.us/page/State_EPR_Laws_Map

⁸² EPA. n.d. Reduce Wasted Food by Feeding Animals. <https://www.epa.gov/sustainable-management-food/reduce-wasted-food-feeding-animals>.

3.3.6 Consider Fee Increase for Pay As You Throw Program

A detailed description of the existing PAYT program (which went into effect in July 2015) is provided in Section 1; because the PAYT potential enhancement options involve curbside collection of recycling (with a future potential addition of green waste), they are included in the enhancement options for recycling and bioconversion detailed in Section 4. PAYT is a variable rate for refuse collection service under which residents are charged in accordance with the size of their refuse cart or carts. The County's PAYT system includes two components: a base fee and a variable fee. All residential customers are assessed a flat fee which is meant to subsidize the cost of operating the RTSs. An additional fee is assessed for curbside refuse collection based on size and number of carts. Table 3-1 summarizes these fees. As seen under the Existing column, the current base fee is \$6.00 and is assessed regardless of whether a customer gets curbside refuse collection. Customers with curbside refuse collection also pay an additional fee based on the size of their cart. The total fee charged to the residential customer is the base fee plus the fee for the cart. A customer with a 64-gallon cart would pay \$6.00 plus \$4.00, for a total of \$10.

Operating costs continue to increase for the County's solid waste system and the County must evaluate revenue sources. The Econservation Institute implementation plan for PAYT recommends that "Kaua'i move toward cost-of-service but do so on a phased schedule."⁸³ The County will consider fee increases for the residential PAYT program, which may be coupled with expanded service offerings. Expanded service and solid waste management options may include adding curbside recycling, curbside green waste and food waste, adding smaller cart size options, and adding solid waste processing facilities (further detailed in Section 4).

Table 3-1 illustrates an example modified rate structure with associated service offering. Actual future program logistics and fee changes may vary and are dependent on decisions that would be made after further evaluation. A user fee increase would further increase revenues: additional modeling would be required to estimate the magnitude of the increase. An increased user fee would require some staff time to plan, communicate, and implement the change.

Table 3-1. Potential Modified Residential Refuse Collection Assessment Options

Program Component	Existing	Increased Fees (Existing System)	2- to 3-Stream (Trash and Recycling, with a potential future addition of Green Waste) with Enhanced PAYT
Description of Service	2 MSW cart sizes (64 -, 96-gallon carts)	2 MSW cart sizes with fee increase (64, 96-gallon carts)	3 MSW cart sizes with fee increase (32-, 64-, 96-gallon carts)
Base Monthly Assessment per Benefited Property ^{a, b}	\$6.00	\$10.00	\$10.00
Curbside Refuse Collection: Cart fees by size			
One 32-gallon cart	n/a	n/a	\$7.00 ^c
One 64-gallon cart	\$4.00	\$8.00	\$19.00 ^c
One 96-gallon cart	\$12.00	\$20.00	\$40.00 ^c
Curbside Refuse Collection: Total fee charged to resident by cart size (base fee + cart fee)			
One 32-gallon cart	n/a	n/a	\$17.00
One 64-gallon cart	\$10.00	\$18.00	\$29.00
One 96-gallon cart	\$18.00	\$30.00	\$50.00

⁸³ Econservation Institute. 2013. Pay-As-You-Throw/Variable Rates for Trash Collection in Kaua'i, HI. June.

Table 3-1. Potential Modified Residential Refuse Collection Assessment Options

Program Component	Existing	Increased Fees (Existing System)	2- to 3-Stream (Trash and Recycling, with a potential future addition of Green Waste) with Enhanced PAYT
Assessment for each additional cart^d			
Each additional 32-gallon cart	n/a	n/a	\$17.00
Each additional 64-gallon cart	\$10.00	\$18.00	\$29.00
Each additional 96-gallon cart	\$18.00	\$30.00	\$50.00

^a The Base Assessment covers the use of the RTSs and is charged regardless of whether the dwelling unit is occupied or the resident opts out of collection.

^b Per County Ordinance 21-1.3, "Benefited property" means real property on which there is a dwelling unit or units. Multiple units on a single piece of property are each considered to be a separate benefited property.

^c Fees are based on the Econservation Institute *Pay-As-You-Throw/Variable Rates for Trash Collection in Kaua'i, HI* report Phase 2 proposed rates.

^d Program rules would be implemented to tier purchase of add-on carts so that the sum of multiple smaller cart sizes is not less than singular purchase of a larger cart size.

Note: n/a = not applicable

4. Recycling and Bioconversion

4.1 Purpose

The purpose of Section 4 is to provide methods to increase and improve recycling and bioconversion efforts in the County. Existing programs and the level of reduction the County is achieving through these programs are summarized in Section 1.5. Additional information on diversion rates is provided in Section 2.

The goals of the new strategies are to do the following:

- Increase diversion of materials from the Kekaha Landfill.
- Minimize costs to the County and customers.
- Promote sustainability and reduce the waste footprint of the island.
- Facilitate the development of small businesses.
- Further protect the environmental health of the County.
- Increase participation in upstream waste diversion programs.

4.2 Background

4.2.1 Legislative

According to HRS Section 342G-1, recycling and bioconversion are defined as follows:

- Recycling means the collection, separation, recovery, and sale or reuse of secondary resources that would otherwise be disposed of as MSW and is an integral part of a manufacturing process aimed at producing a marketable product made of post-consumer material.
- Bioconversion means the processing of the organic fraction of the waste stream through biological or chemical means to perform composting or generate products including, but not limited to, fertilizers, feeds, methane, alcohols, tars, and other products. This term includes, but is not limited to, biogasification, acid hydrolysis, pyrolysis, and fermentation. This term does not include any form of incineration or methane gas extraction from a municipal waste landfill.

HRS Section 342G goes on to state, “each county shall consider the following solid waste management practices and processing methods in their order of priority:

- 1) *Source reduction;*
- 2) *Recycling and bioconversion, including composting; and*
- 3) *Landfilling and incineration.”*

To encourage progress toward following these priorities for solid waste management, state statutes established the following goals to reduce the solid waste stream prior to disposal through source reduction, recycling, and bioconversion (HRS Section 342G-3):

- 25 percent reduction by January 1, 1995.
- 50 percent reduction by January 1, 2000.

In addition, as discussed in Section 3.2.1, the Aloha+ Challenge includes a 2030 goal to reduce the solid waste stream before disposal by 70 percent in the state, the County Zero Waste Resolution includes a 70 percent diversion goal by 2023, and the 2018 General Plan includes an objective to “reduce the solid waste stream by 70 percent” and become a “Sustainable Island.” As discussed in Section 2, in FY 2019, the County diverted approximately 42 percent of the solid waste stream through source reduction, recycling, and bioconversion. Significantly increasing waste diversion will require substantial system changes that include implementation of curbside recycling, construction of a new material recovery facility (MRF), new legislation, staff resources, and many other improvements.

The County's recycling and waste diversion programs are affected by fluctuations in the global recycling industry. For example, in July 2017, China notified the World Trade Organization of its plans to ban import of 24 solid waste materials by the end of 2017. The ban went into effect in January 2018. The banned materials include most plastics, unsorted paper, and textiles.⁸⁴ In addition, new regulations established extremely low contaminant limits for material acceptance.⁸⁵ China's initiative has had an immediate effect on existing markets for recyclables, causing recyclers to seek new markets and evaluate methods to achieve lower contaminant levels.⁸⁶ At the time of the drafting of this report, the Chinese ban on recyclables has had a devastating impact on recycled commodities throughout the U.S. and locally on Kaua'i.

On January 1, 2021, the new Basel Convention requirements that cover the international shipment of plastic scrap went into effect.⁸⁷ While existing contracts that cover the management of the County's recyclables shield the County from direct impacts, these new requirements could potentially effect Kaua'i's future recycling program. The County will need to consider potential future impacts as contracts expire and/or as new recycling programs are implemented.

Given the volatility in the recyclable commodities market and the economic and environmental impact of processing and shipping recyclables to overseas markets, it is important for the County to continue to advocate for reuse, source reduction, EPR, and cost-effective on-island processing and recycling.

4.3 Material Management System Options

Recycling and bioconversion management systems are multifaceted, with many intertwined moving pieces. The success of enhancements made to one part of the system are often reliant on making changes to another part of the system. Because of this, there is a range of possible changes that can be made with varying degrees of effect on the overall system.

Table 4-1 shows a range of options for possible enhancements to the primary system elements for residential recycling and bioconversion management systems in Kaua'i. The system options are identified across the top row. Starting with the existing and moving toward the right, these options are increasingly more complex and more expensive (yet rely more heavily on the user fee [UF]); but also provide more opportunity for additional diversion. Within each of the system options, corresponding entries for Funding Source, PAYT, Curbside Collection, Drop-Off Recycling, Education and Program Staff Addition, Backyard Composting Program, and Processing Facilities are shown. A range of probable values is shown below for comparative purposes only. Actual future funding sources, fee increases, and program logistics may vary and are dependent on decisions that would be made at a later date.

Table 4-1 also shows how the enhancement opportunities discussed specifically in Section 4 and generally throughout the ISWMP have multiple facets which are highly dependent on each other. For example, to implement the option for curbside recycling collection, an MRF would be needed to process the material, additional public education would be needed to inform residents on how to participate in the program, and additional County staff would be needed to manage the program. Reliable markets for the recycled commodities would also be essential.

⁸⁴ World Trade Organization. 2017. Notification, G/TBT/N/CHN/1211, 17-3880. July 18.

⁸⁵ Resource Recycling. 2017. "Roundup of the latest developments on China's ban." September 6. <https://resource-recycling.com/recycling/2017/09/06/roundup-latest-developments-chinas-ban/>.

⁸⁶ Resource Recycling. 2017. "How WM and other exporters are reacting to China's ban." July 25. <https://resource-recycling.com/recycling/2017/07/25/wm-exporters-reacting-chinas-ban/>.

⁸⁷ E.P.A. 2021. "New International Requirements for the Export and Import of Plastic Recyclables and waste." May 13. <https://www.epa.gov/hwgenerators/new-international-requirements-export-and-import-plastic-recyclables-and-waste#overview>

Table 4-1. Residential Material Management System Options

	Existing	Increased Fees (Existing System)	2- to 3-Stream with Enhanced PAYT
Funding Source (% UF, % GF)	40% UF / 60% GF	40% UF / 60% GF	75% UF / 25% GF
PAYT (Section 3)	no change	no change	3 MSW cart sizes with fee increase (32-, 64-, 96-gallon carts)
Curbside Collection – Materials and Frequency (Section 4)	weekly MSW	weekly MSW	biweekly MSW biweekly recycling (part of county 1 week, remaining part the other week) biweekly green waste (potential future add once recycling implemented)
Drop-off Recycling Program (Section 4)	no change	double number of bins	eliminate most bins
Education and Program Staff Addition (Section 7)	no change	one additional staff	two additional staff
Backyard Compost Program (Section 3)	no change	aggressive increase in free bins and master composter program	no change
Processing Facilities (Section 4)	no change	no change	MRF and RFPs for food waste composting

Notes:

GF = General Fund

RFP = request for proposal

4.4 Enhancement Opportunities

This section provides opportunities the County will consider for enhancing the recycling and bioconversion efforts throughout the island. Implementation of these opportunities will be dependent on securing the required staff resources and funding.

4.4.1 Build upon Previous Curbside Recycling Collection Studies and New Material Recovery Facility Feasibility and Siting Study

Addition of a curbside recycling program and MRF are essential elements of increasing waste diversion and making the island a more sustainable island. While both of these items were also included in the 2010 Plan and have been studied previously, additional research to support those studies is needed to update outdated information and changed conditions and make sure the County plans appropriately in future budgets. This enhancement opportunity involves a curbside recycling program and MRF and is further discussed in the following two sections.

4.4.1.1 Evaluate Implementation of a New Curbside Collection for Recycling with a Potential Future Addition of Green Waste and Food Waste or Enhance Drop-off Recycling

The County will coordinate a study to evaluate implementation of a new curbside collection program for recycling, green waste, and potentially food waste or to enhance drop-off recycling. The study will focus on the addition of curbside recycling, but may also briefly cover the future addition of green waste and food waste. Previous studies have provided some initial evaluation of this concept. However, significant recycling market changes as well as other changes to the local conditions could drastically change the

findings and should be re-evaluated closer to the date of potential implementation. A potential resource for County staff as they review future options is The Recycling Partnership's *Guide to Community Material Recovery Facility Contracts*, published in June 2020 with the intent to inform optimization of public-private partnerships in the current climate.⁸⁸

As of FY 2019, the County provides weekly MSW collection to residents. Enhancement opportunities for this program are available for a variety of materials (that is, recycling, green waste, and food waste), frequencies (that is, biweekly or weekly collection), and combinations of those items. For example, enhancing the collection system can be done all at once for all possible materials or the County can choose to only implement curbside collection for portions of the waste stream. Some options include:

- Weekly MSW and biweekly recycling.
- Biweekly MSW, biweekly recycling, and biweekly green waste.
- Biweekly MSW, weekly recycling, and weekly green waste and food waste.

However, any enhancement of the curbside collection program would be dependent on the development of an MRF (for recyclables) and/or composting facility (for green waste and food waste) to process the additional material. As of FY 2019, the existing infrastructure is not equipped to support the increase in diverted material that would result from curbside collection of recycling, green waste, and food waste. Development of an MRF and/or composting facility is further discussed below.

Establishing a curbside collection program would require a significant investment in not only a processing facility but also equipment, including collection trucks and recycling carts, and manpower to collect the material. Although establishing and running curbside collection will be costly, this enhancement opportunity is supported by the public and will increase the diversion rate for the County. The program could also justify an increase in user fees as noted above, which would help to offset increased costs.

If the County is successful in implementing curbside recycling program, the current drop-off recycling program could be significantly cut back; however the quantity of cardboard collected through the drop-boxes will necessitate keeping drop-box collection for this material. The \$880,000 annual cost of that program could be reduced by approximately 50 percent and allocated toward the curbside recycling program costs.

If the County is unable to implement the curbside recycling program and MRF, they will instead consider enhancing the current drop-off recycling program by increasing the number of collection bins. Increasing the number of drop-off bins would allow for the County to have better coverage across the island making recycling more convenient for residents.

4.4.1.2 Complete a Feasibility Study and Siting Study of a New Material Recovery Facility

The County will evaluate the implementation of a new MRF. In 2016, CalRecovery, Incorporated developed *A Conceptual Design for Single Stream Materials Recycling Facility (Clean MRF) at the Existing Kaua'i Resource Center* report⁸⁹ and subsequently a *Final Environmental Assessment of Materials Recycling Facility*⁹⁰ for this site. A re-evaluation is recommended due to significant recycling market changes as well as other changes to the local conditions including the feasibility of the previously selected site (the KRC) and changes in regulations. Specifically, Act 073, passed during the 2020 Legislative Session, restricts the vertical or horizontal expansion of waste reduction facilities that are within 0.5 mile of any residence or hospital. The KRC is within 0.5 mile of a residence. This will need to be further evaluated to see if it removes the KRC as a potential site for the MRF.

⁸⁸ The Recycling Partnership. 2020. Guidance Issued on MRF Contracts for Local Governments. <https://recyclingpartnership.org/press-release-guidance-issued-on-mrf-contracts-for-local-governments/>.

⁸⁹ CalRecovery, Inc. 2016. *A Conceptual Design for Single Stream Materials Recycling Facility (Clean MRF) at the Existing Kaua'i Resource Center*. December.

⁹⁰ CalRecovery, Inc. 2016. *Final Environmental Assessment of Materials Recycling Facility for County of Kaua'i, Determination: Finding of No Significant Impact (FONSI)*. May.

Beyond the legislative issue discussed above, the use of the KRC has expanded over the last 5 years. If the County were to use the KRC site for an MRF, this would impact their ability to use it for other recycling and reuse programs such as the HI5 redemption center, household batteries and florescent bulbs recycling, backyard composting bin storage, County office space, and the new Household Hazardous Waste Drop and Swap. All of this needs to be factored into this evaluation.

As mentioned above, curbside collection of recycling would need to be implemented to support an MRF if the County decides to move forward with an RFP under this enhancement opportunity. The MRF would primarily be supported by a new County run curbside collection program. The sale of materials from the MRF would help offset some of the costs, but because of the volatility of the recycling markets, should not be depended on to cover all costs. As such, the County should explore public-private partnership options to help with the high cost of constructing, maintaining, and operating an MRF and assess contract setup as part of the evaluation. A potential resource to consider as County staff evaluates future options is The Recycling Partnership's *Guide to Community Material Recovery Facility Contracts*, published in June 2020 with the intent to inform optimization of public-private partnerships in the current climate.⁹¹

According to *A Conceptual Design for Single Stream Materials Recycling Facility (Clean MRF) at the Existing Kaua'i Resource Center* report prepared in 2016 by CalRecovery, Incorporated, the capital cost for an MRF with an initial processing rate of 15,000 tons per year would be on the order of \$10,900,000 in 2015 dollars (\$12,204,000 in 2021 dollars). Estimated annual operations and maintenance costs are on the order of \$1,505,000 in 2015 dollars (\$1,729,000 in 2021 dollars).⁹² In offsetting some of these costs, the County estimates that with an MRF and curbside collection, its expenditures on the drop box program would be cut in half (a savings of \$440,000 annually), and material revenues would return about \$918,000 annually. Further, it is estimated the implementation of curbside collection and the MRF would extend the life of the Kekaha Landfill by 9 to 12 months. If the County increased the user fees as shown in last column in Table 3-1 (2- to 3-Stream [Trash and Recycling, with a potential future addition of Green Waste] with Enhanced PAYT), the residential portion of the program would be covered, and the additional revenues would likely pay for much of the non-residential portion as well. The non-residential portion would still need to be paid through the County budget. It is recommended that the County further evaluate curbside collection of recyclables and organics, and the siting and development of an MRF.

4.4.2 Support Deposit Beverage Container (HI5) Deposit Increase

After being enacted, the HI5 law increased the statewide redemption rate of aluminum, plastic, and glass containers to nearly 80 percent in 2009. Unfortunately, the redemption rate has slowly been decreasing in recent years.⁹³ One way to improve participation would be to incentivize consumers by increasing the deposit for containers (and in turn the amount they receive when they return their bottles and cans). This can be done through a one-time deposit increase (for example, from 5 cents to 10 cents) or incremental annual increases.

The HI5 program is one of the most effective waste diversion programs in the County.⁹⁴ Improving the redemption rate will help this effective program provide even more environmental benefits and waste diversion.

Each year, bills are introduced to modify the DBC legislation. The County Solid Waste Division will support a deposit fee increase with the Mayor's approval.

⁹¹ The Recycling Partnership. 2020. Guidance Issued on MRF Contracts for Local Governments. <https://recyclingpartnership.org/press-release-guidance-issued-on-mrf-contracts-for-local-governments/>.

⁹² CalRecovery, Inc. 2016. *A Conceptual Design for Single Stream Materials Recycling Facility (Clean MRF) at the Existing Kaua'i Resource Center*. December.

⁹³ Office of the Auditor. 2019. Financial and Program Audit of the Department of Health's Deposit Beverage Container Program, June 30, 2018. Report No. 19-08. March.

⁹⁴ County of Kaua'i. n.d. Hawai'i Bottle Bill (HI 5). <https://www.kauai.gov/HI5>.

4.4.3 Evaluate and Expand Additional Commercial Disposal Restrictions (such as C&D) and Identify Recycling Opportunities for Businesses

As of FY 2019, County Ordinance 902 bans the landfill disposal of commercially generated loads exceeding 10 percent corrugated cardboard, 10 percent ferrous and non-ferrous metal, or 10 percent green waste by volume.⁹⁵ The County previously tried to pass a commercial recycling ordinance for businesses generating at least 3 cubic yards of waste per week. The County had the support and approval of the Mayor and regulators, but C&D stakeholders were so strongly against that it was terminated before it even went to Council. For an expanded disposal ban or new recycling ordinance to be successful, the County will first need stakeholder support and the necessary funds and resources to conduct the corresponding education, outreach, and monitoring that it requires. The County should consider boosting stakeholder outreach and support by promoting the existing goals programs and projects that are supportive of waste reduction (for example, the Kaua'i Kakou General Plan 2018, U.S Green Building Council, and LEED). If the necessary components can be put into place, the County will consider expanding the materials banned from landfill by Ordinance 902 to include, but not be limited to, the following:

- C&D material – According to the 2016 Waste Characterization Study, inerts and other C&D is the most prevalent material class in the County's overall waste stream, with over 19,800 tons disposed of annually at the landfill (23.7 percent of the overall waste stream). Implementation of a C&D materials disposal ban would encourage alternate solutions to disposal and would help extend the landfill life. However, it is important that diversion options be available and accessible prior to implementation to ensure that businesses and industries on-island have viable alternatives to disposal. Some on-island options include:
 - Concrete and asphalt (1.3 percent of waste stream) – Can be crushed and recycled into aggregate or new asphalt and concrete products used in construction projects on-island; preserved for reuse through deconstruction. There is a company on-island that is permitted to do this work and had fees less than landfill.
 - Wood and Pallets, clean/untreated and treated (14.1 percent of waste stream) – Untreated wood and pallets can potentially be captured for use in compost or mulch, preserved for reuse through deconstruction, or used by cottage industries that produce furniture or other wood products using recycled material. While there is some backhauling of this material, there are no composting facilities that are permitted to accept and process pallets. There would need to be market development for this to be a viable diversion option.
 - Mixed C&D debris (8.3 percent of waste stream) – Preserved for reuse through deconstruction; brick, concrete, and masonry can be recycled onsite as fill, subbase material or driveway bedding; de-papered and crushed gypsum can be used, in moderate quantities, as a soil amendment.⁹⁶ There would need to be further analysis and market development for this to be a viable diversion option.⁹⁷
- Mixed paper – According to the 2016 Waste Characterization Study, mixed paper accounts for 4.1 percent of the County's waste stream (6.2 percent if newspaper and white ledger paper are also considered). The current material management system has limited availability of on-island markets for mixed paper. As further discussed in Section 8, paper is currently marketed by GID, which has the only permitted recycling facility on-island with the capacity to bale and ship recyclable materials to market and there are no paper manufacturing facilities on Kaua'i. Off-island markets for paper demand low contaminant levels, and pricing has fallen significantly in the past few years, making an increase in the amount of paper being diverted through a landfill ban difficult to market and recycle. Although some quantity of paper may be used in innovative, cottage scale uses such as old

⁹⁵ County of Kaua'i. 2020. *Ordinance 902*. <https://www.kauai.gov/LandfillBans>. Accessed May 14, 2020.

⁹⁶ U.S. Environmental Protection Agency. 2020. *Sustainable Management of Construction and Demolition Materials*. <https://www.epa.gov/smm/sustainable-management-construction-and-demolition-materials#WYCD>. Accessed May 21, 2020.

⁹⁷ Note that some drywall products contain synthetic materials and may also include coal ash containing heavy metals. Additionally, contractors often use wallboard that contains fiberglass to prevent mold, and asbestos may be present in wall sheets and joint compounds in older buildings. For these reasons, further analysis would be needed to ensure mixed C&D debris could be safely used as a soil amendment prior to proceeding.

newspaper in animal bedding and shipping applications, such uses are not likely to use large quantities.

There would need to be market development for this to be a viable diversion option.

- Food waste – According to the 2016 Waste Characterization Study, food waste accounts for 10.3 percent of the County’s waste stream. The current material management system has limited availability of on-island markets for food waste, but some efforts are already underway that could possibly be expanded or evolved.

As discussed in Section 1, food banks already partner with many local businesses, grocery stores, schools, and farmers to help eliminate the waste of edible foods. With a ban on food waste there may be further opportunities to reduce food waste generation through donation of “imperfect foods” or “ugly produce” to food banks from local restaurants, farmers, and grocery stores. Also discussed in Section 1, local pig farmers currently collect food waste from certain local hotels, restaurants, and the County jail to use as feedstock. There may be opportunity to formalize and expand this effort through a partnership with the County that can help connect the local pig farmers with other generators of food waste, such as, schools, slaughterhouses, and fishermen.

These existing markets are limited, however, in the amount and quality of food waste that they can accept so they would not be able to sustain a landfill ban on food waste on their own. There would need to be market development for this to be a viable diversion option. The success of reducing food waste in the landfill would likely rely on implementing a compost demonstration project to test the different feedstocks and ultimately identify and implement composting capacity (could be construction of a compost facility or addition at existing facilities). If the diversion and ban of commercial food waste is successful, the County could consider adding residential food waste to the ban as well. This would require a long-term solution for collection (likely curbside) and processing (compost facility with ability to market off-island).

Table 4-2 describes the general feasibility, advantages, and disadvantages of implementing a landfill ban for each of these material categories.

Table 4-2. Materials for Consideration for Expanded Commercial Recycling Landfill Bans

Material	Feasibility	Advantages	Disadvantages
C&D Material (focus on concrete, asphalt, clean/untreated wood, dry wall/gypsum, and mixed C&D debris)	Difficult Would require a recycling ordinance for construction companies Reuse options and recycling markets must exist on-island	Boost local economy Lower construction and renovation costs Preserve landfill space	Additional burden on the construction companies
Mixed Paper	Difficult Would require a recycling ordinance for businesses. Implementation would be more successful with the construction of an MRF	Preserve landfill space	Cost of paper recycling is very high at the moment. Mixed paper has low to no commodity value If source separation is not implemented, low contaminant limits for materials to be accepted for recycling may be difficult to achieve, which may lead to landfilling despite the ordinance

Table 4-2. Materials for Consideration for Expanded Commercial Recycling Landfill Bans

Material	Feasibility	Advantages	Disadvantages
Food Waste	<p>Moderate</p> <p>Food banks and local pig farmers have programs in place</p> <p>Implementation of a commercial recycling ordinance relies on the success of a compost demonstration project and/or permitting of an existing compost facility to take food waste or construction of a compost facility</p> <p>Would be best implemented with a tiered approach with the following steps:</p> <ol style="list-style-type: none"> 1. Commercial recycling ordinance for food waste 2. Support small-scale composting facility 3. Completion of a compost demonstration project 4. Commercial ban on food waste 5. Construction of a large compost facility 6. Residential ban on food waste with curbside recycling 	<p>Preserve landfill space</p> <p>Reduce methane gas emissions at landfill</p>	<p>A commercial composting facility is necessary for a large-scale program</p>

4.4.4 Support Expansion of Tiered Composting Regulations to Encourage Smaller Composting Operations

The County will support the HDOH’s efforts to expand and clarify regulations allowing for tiered registration and permitting of solid waste composting facilities to streamline regulation and promote small-scale onsite composting.

Existing composting regulations provide for a tiered regulatory system (that is, permit exemptions, permit-by-rule [aka registration], and full permits) that allows the issuance of permits for multi-scale composting operations. The HDOH develops permit conditions for each facility based on evaluation of the potential risk of the proposed operation to public health and the environment. This results in permit conditions with an appropriate level of stringency with respect to risk and provides an opportunity to permit various scales of composting operations at the appropriate level.

However, existing regulations have not been updated in years and pose barriers to small and midsize composting operations. Revised regulations are needed to facilitate permitting of multi-scale composting operations. The HDOH is working on regulatory updates to clarify requirements and increase the efficiency of the permitting process, as well as streamline application forms specific to smaller, low-risk facilities. These and other, similar regulatory changes would result in more permitted compost facilities and would increase diversion of organics.

4.4.5 Design and Implement Compost Demonstration Project, Then Evaluate Food Waste Composting Program

In an effort to support multiple of the enhancement opportunities already discussed, the County will work with a private composting facility that is interested in onsite composting of select compostable materials (for example, green waste, pallets, food waste, manure/agricultural waste, fish waste, and/or sewage sludge) to design and implement a compost demonstration project to test the different feedstocks and determine if incorporating those feedstocks into an on-island compost facility is feasible. The private

composting facility will be selected through an RFP process initiated by the County. Success of the compost demonstration will help the County determine what it should do next regarding compostable waste. Success would suggest that the County should consider if a landfill ban on food waste, pallets, and/or residential green waste is feasible and if separate curbside collection of food waste can be added to the existing material management system. Success and interest in the compost demonstration project would also help determine if the County should issue an RFP for establishing food waste composting at private facilities.

4.4.6 Support Permit Modifications for Food Waste Composting at Private Facilities and/or Issue RFP(s)

The County could also support permit modification for food waste composting at existing private facilities, which would provide increased capacity in composting and the means to increase material diversion. Establishing one or more compost facilities on-island that accept food waste would also support the implementation of separate curbside collection of green waste and food waste. Ensuring one or more of these materials (green waste and food waste) would be available for use at the compost facilities would provide incentive for private businesses to invest in this type of operation.

An RFP for establishing food waste composting at a private facility is another way that the County could support development of composting capacity of food waste. The RFP could be paired with a food waste ban, as discussed earlier in this section, to provide material to the facility and help ensure its success. The facility could also benefit from other recommended bans for C&D materials, such as gypsum and wood. As previously discussed, gypsum can be used as a soil amendment and wood waste can be chipped/mulched and added to the feedstock for the compost.

4.4.7 Offer Grant-in-Aid Funding for Recycling and Organics Projects

The County will provide Grant-in-Aid funding for priority recycling and organics projects on-island. One potential use for a Grant-in-Aid program would be offering incentives, such as start-up cost grants, for starting cottage industries that create value added products made from recycled paper, plastic, glass, and green waste. Award of the grants would be dependent on businesses repurposing waste and recyclable material to make their product. The County has a well-established Grant-in-Aid program through the Department of Finance and has previously offered recycling and waste diversion grants to local organizations.

4.4.8 Issue RFP for Pallet Processing Facility to Process Pallets

The County will issue an RFP for a processing facility to chip, mulch, and/or market pallets for beneficial reuse or recycling. The goal of the RFP will be to gather information on and ultimately develop a pallet processing facility or implement new management techniques so that pallets can be beneficially reused or recycled, which will promote access to markets and local reuse of materials. If beneficial reuse technologies could be implemented for pallets the County would be successful in supporting a market as well as diverting waste from landfill. To best support a pallet processing facility, the County would need to implement a landfill ban on pallets in conjunction with the program

This enhancement opportunity could work alongside EPR legislation for pallets.

4.4.9 Allocate Appropriate Resources to Hire New Staff for Recycling Programs

A key element of expanding recycling programs is having the appropriate resources (budget and staff) to support these programs. While some program enhancement opportunities can be done with little or no funding (such as Support HI5 Deposit Increase), the majority will need new funding to support successful development and implementation. For planning purposes, we have assumed an additional \$110,000 per year for additional resources (to be staffed as the County sees fit) for the recycling programs. These additional staff would be separate from the additional staff discussed in Section 7, Public Education. Estimates of new funding requirements are provided in Section 12.

4.4.10 Co-Locate New Recycling Drop-off Sites and HI5 Certified Redemption Centers with Existing Solid Waste Facilities When Possible

When siting new recycling drop-off locations and HI5 CRCs, the County will prioritize co-location with existing solid waste facilities when possible. The County aims to increase participation in voluntary recycling programs by offering more convenient opportunities for residents to drop off recyclables while using other County solid waste services. Space is an issue at the RTSs, and the County will continue to look for creative ways to address this constraint.

5. Special Wastes

5.1 Purpose

The purpose of Section 5 is to identify the special waste management practices associated with successfully implementing the Plan.

5.2 Background

5.2.1 Legislative

Per HRS Section 342G-26(e), the special waste component of the Plan should identify current and proposed programs to ensure the proper handling, reuse, and long-term disposal of special wastes.

HRS Section 342G-1 defines special waste as “any solid waste that, because of its source or physical, chemical or biological characteristics, requires special consideration for its proper processing or disposal or both. This term includes, but is not limited to, asbestos, used oil, petroleum-contaminated soil, lead acid batteries, municipal waste combustion ash, sewage sludge that is not hazardous waste, agricultural and farm-generated wastes that are normally placed in landfills, medical wastes, tires, white goods, and derelict vehicles.” Abandoned, unattended, and general vehicle disposal will also be addressed with derelict vehicles in this section.

Per Chapter 21 of the Kaua'i County Code, special wastes include “tires, asbestos-containing materials, white goods, and dead animals (except those disposed of by the Kaua'i Humane Society), and any mixed waste containing used tires, asbestos- containing materials, white goods, or dead animals. These wastes are defined as ‘special’ because they require special handling or processing by the County to comply with federal and state regulations.”

Though not specifically mentioned in HRS Section 342G-1 or Chapter 21 of the Kaua'i County Code, the County also considers household batteries, propane tanks, used cooking oil, and C&D materials to be special waste.

Section 1 includes details of the current special waste management practices on Kaua'i, organized by special waste type.

5.3 Enhancement Opportunities

In addition to ongoing practices, there are a number of enhancement opportunities with respect to improving special waste management in the County. These enhancement opportunities are described in the following subsections.

5.3.1 Increase Public Education Regarding Proper Disposal of Acetylene Tanks

Acetylene is considered a hazardous material and as such, recycling and/or disposal of acetylene tanks is challenging. Acetylene tanks are considered hazardous waste and are not intentionally accepted at any RTS, the Kekaha Landfill, or the Puhi Metals Recycling facility. To improve waste management with acetylene tanks, the County will increase public education regarding proper disposal of acetylene tanks. Efforts will focus on encouraging the public to swap out empty tanks when purchasing new tanks to ensure proper recycling and/or disposal. This would require some staff time. If successful, the County's public education campaign will reduce the number of acetylene tanks illegally dumped at County facilities and the associated disposal costs.

5.3.2 Expand Disposal Bans to Include Select C&D Materials

As previously described in Section 4.4.3 for the enhancement opportunity to evaluate additional commercial disposal restrictions and identify recycling opportunities for business, C&D is one of the materials that should be considered for commercial disposal restriction, similar to County Ordinance 902, which bans the landfill disposal of commercially generated loads exceeding 10 percent by volume of specific materials (currently, commercial corrugated cardboard, ferrous and non-ferrous metal, and green waste). C&D was one of the major material types in the disposal stream from the 2016 Waste Characterization Study, at 23.7 percent of the overall waste stream. The County will consider a disposal ban on select C&D materials that could include concrete and asphalt, untreated wood, pallets, untreated dry wall, and other mixed C&D debris. Implementation of a C&D materials disposal ban would encourage alternate more sustainable solutions to disposal, which will promote a sustainable island and also preserve the life of the landfill. However, as described in Section 4.4.3, it is important that diversion options be available and accessible prior to implementation to ensure that businesses and industries on the island have viable alternatives to disposal, such as through recycling/reuse in numerous construction applications, compost, or wood product industries.

The general steps that would be required to implement this and the complementary enhancement opportunities include the following:

- 1) Identify specific C&D materials to target and a proposed timeline for phasing in other C&D materials.
- 3) Engage with C&D stakeholders to collect feedback that can be used to develop the ordinance in a way that garners the needed support for success.
- 4) Secure diversion options (for example, market development and issuance of RFPs for reuse and/or alternate processing of C&D materials) that can be used as an alternative to disposal.
- 5) Draft and pass legislation.
- 6) Perform public outreach and education.
- 7) Implement new commercial disposal restriction (exact type to be dependent on stakeholder engagement and materials included).

More detail on this enhancement opportunity and the specific materials that are good candidates for disposal bans is provided in the enhancement opportunity description in Section 4 and in the materials marketing and procurement discussion in Section 8. Market development of C&D materials is discussed in Section 8.3.9 and for the enhancement to evaluate on-island recycling opportunities and issue RFPs for select materials is discussed in Section 8.4.3).

5.3.3 Prepare County Videos to Address Public Educations Needs for Special Wastes

There are a few County programs involving Special Wastes that could potentially benefit from County videos being made and placed on the County website. For example, the contamination issues with the used-motor-oil program and the best practices for dropping off household batteries could be the topics of videos that could enhance existing public education efforts that have been taken for these items. More detail on this enhancement opportunity and other public education efforts is provided in the Enhancement Opportunity description in Section 7.

5.3.4 Evaluate Opportunities for Sewage Sludge Diversion and Act on Opportunities if Cost-Effective and Overall Beneficial

The County disposes of sewage sludge in the landfill. As the availability of staff resources and funding allow, the County plans to work with the private composting facilities on the island to modify permits to enable them to accept sewage sludge or develop a new centralized facility to accept and compost this material. More detail on this enhancement opportunity is provided in the Enhancement Opportunity description in Section 4.

5.3.5 Implement Collection of Used Cooking Oil at the KRC

Used cooking oil is either being disposed of at the landfill or recycled by Kaua'i Grease Traps (for a fee). Because there are limited options for diversion of used cooking oil, the County will implement collection of used cooking oil at the KRC for subsequent recycling. As part of this evaluation, the County should take steps to quantify the amount of used cooking oil disposed of at the landfill. Depending on the significance of this stream and the cost for collection, consolidation, and subsequent recycling, the County can evaluate whether this initiative will be a worthwhile endeavor.

6. Household Hazardous Waste and Electronic Waste

6.1 Purpose

The purpose of Section 6 is to do the following:

- Characterize the County's current HHW collection program, provide strategies for improving the program, and evaluate the strengths and weaknesses of each strategy.
- Address used electronics collection and recycling and provide program strategies for the County to consider.

6.2 Background

6.2.1 Legislative

Per HRS Section 342G-26(f), the HHW component of the Plan should assess the quantity and type of hazardous wastes generated by residences in the county; describe current collection, recycling, and exchange programs, as well as current methods of disposing of HHW; and develop programs for the collection of household hazardous wastes that protect the public and the environment from these substances.

6.2.1.1 Hazardous and Household Hazardous Waste

Hazardous waste, HHW, and universal waste are regulated under numerous federal and state provisions, including the following:

- 40 CFR Parts 260 to 273.
- 11-260.1 to 11-273.1, HAR.
- HRS 342-J.

Hazardous waste is regulated under the federal Resource Conservation and Recovery Act (RCRA), Subtitle C. Per this federal law, hazardous waste exhibits at least one of four characteristics – ignitability, corrosivity, reactivity, or toxicity.

The distinction between hazardous waste and HHW is that HHW is generated by households and is allowed exemption from many requirements applicable to hazardous waste. Notably and as pertains to this section, HHW is not regulated as hazardous waste, although HHW can still be dangerous and cause substantial known or potential hazards to human health and the environment. Examples of HHW include automotive products, cleaners, pesticides, herbicides, paints and solvents. The general public and businesses that generate 100 kilograms or less of hazardous waste per month (known as very small quantity generators) are able to dispose of HHW without the rigorous regulation required of hazardous waste.

6.2.1.2 Used Electronics

Used electronics (that is, eWaste) include discarded computers, cell phones, televisions and other electronic products. Those with CRTs, such as color computer monitors and televisions, are considered hazardous when discarded because of the presence of lead in the CRT. Lead is not considered an environmental problem while the monitor or television is intact; however, the lead can leach when compacted or broken and create an environmental hazard. LCDs from flat screen panels and laptop computers are also considered hazardous by the State of Hawai'i.⁹⁸

In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can

⁹⁸ Per a memo from the HDOH to the City and County of Honolulu and PVT Land Company, dated June 9, 2006.

present problems. In 2017, the Hawai'i Hazardous Waste Program created a category of universal waste for electronic items based on research suggesting that most electronic waste will qualify as hazardous waste.⁹⁹

Because quantities of eWaste are increasing rapidly, many state and local governments are experimenting with collection, donation, and recycling of used electronic products, as well as producer responsibility programs that involve producers of electronics in helping to recover these products at end-of-life.

Kaua'i County Code Section 21 prohibits the disposal of commercially generated monitors (CRTs and LCDs) at RTSs and the landfill.

The Hawai'i Electronic Device and Television Recycling Law (HRS Chapter 339D) was established in 2008 and states that manufacturers of televisions, computers, computer printers, computer monitors, and portable computers must operate recycling programs.¹⁰⁰ The State offers resources and information regarding this law, including consumer information and a list of manufacturer recycling plans, at www.health.hawaii.gov/eWaste.

Current County HHW and electronic waste management programs are discussed in Section 1.

6.2.2 Enhancement Opportunities

This section provides opportunities the County will consider for enhancing the convenience and effectiveness of HHW and eWaste management. Implementation of these opportunities will be depending on securing the required staff resources and funding.

6.2.2.1 HHW Enhancement Opportunities

Evaluate a Drop-and-Swap Program at the KRC

The County will evaluate instituting a Drop-and-Swap program for HHW at the KRC to promote reuse of materials in the community. Existing staff can be trained on hazardous materials handling and the program could operate for limited hours on a weekly basis. The program would also include liability waivers for the public who swap HHW at the KRC. Items not swapped within a certain timeframe (for example, 6 months from drop) would be transferred to the semiannual HHW collection program. This would require some staff time.

Network with Automotive Stores and Repair Shops Regarding Automotive Fluids and Materials

In an attempt to collect more automotive fluids and materials, the County will network with automotive stores and repair shops to see how they may be able to directly service the public for managing items such as antifreeze, used motor oil, and other fluids and materials. The County's role in this would be to help describe the current problem to automotive stores and repair shops and then share information that the automotive stores and repair shops provide (if they are interested). This would require some staff time. Other than the semiannual HHW collection events, there are no programs that accept residentially generated automotive fluids and materials. The disposal instructions for these materials are largely to use absorbent material to soak up the liquid and then place in the trash. If automotive establishments accepted these materials, it may increase diversion from the landfill.

⁹⁹ Universal wastes include certain categories of hazardous waste that are commonly generated by a wide variety of establishments, such as batteries, pesticides, mercury-containing equipment, lamps, and aerosol cans (EPA. "Universal Waste." Accessed April 30, 2021. <https://www.epa.gov/hw/universal-waste/>.)

¹⁰⁰ State of Hawai'i, Department of Health. 2020. Electronic Device and Television Recycling Law. <https://health.hawaii.gov/eWaste/>.

Advocate for Extended Producer Responsibility for Select Materials

A good candidate for EPR is fluorescent tubes. The County collects fluorescent tubes at the KRC and at semiannual HHW collection events; however, the added opportunity to advocate for EPR can reduce the waste stream. It should be noted that the light industry is increasingly moving toward bulbs with less toxic content and this is also reducing the waste stream. More detail on this enhancement opportunity is provided in the Enhancement Opportunity description in Section 3, where EPR is considered for a range of materials.

6.2.2.2 Electronic Waste Enhancement Opportunities

Assess Feasibility of Accepting eWaste at RTSs After Completion of RTS Upgrades

While eWaste recycling is offered free of charge 6 days a week in a centralized location, many residents prefer ongoing regional drop points for recycling. As a result, the County would like to assess the feasibility of accepting eWaste at RTSs after the completion of RTS upgrades currently in the design phase.

The assessment will involve a variety of factors, including, but not limited to, the following:

- Assessment of available space after completion of ongoing RTS projects.
- Understanding of staffing, eWaste containment, and other logistical requirements should eWaste be accepted at RTSs.
- Assessment of eWaste generation in the future.
- Evaluation of options with eWaste hauling and recycling contractors regarding ability and cost to accept more eWaste.
- Understanding of necessary permit changes and feasibility of such changes.
- Cost-benefit analysis of accepting eWaste at RTSs.

The RTSs are undergoing improvements that will increase processing, capacity, and traffic flow. In conjunction with or after completion of these improvements, each RTS will be evaluated to determine if the facility could potentially house an area dedicated to eWaste. At a minimum, eWaste would need to be shielded from weather elements and would require construction of an overhead cover. In addition, it should be evaluated how adding an eWaste staging area would impact traffic flow at the facility, staffing, containment and handling protocol to confirm that efficient operations can be maintained.

To adequately size eWaste areas and inform costs for recycling/disposal, the County would gather data on the rate at which electronics are being purchased on the island. Data may also be gathered on where the majority of eWaste is being disposed (at the Puhi Metals Recycling facility, other retailers, or by illegal dumping) and if residents/businesses are holding onto large quantities of eWaste (or if they have been properly taking them to the Puhi Metals Recycling facility and other retailers). These eWaste areas would be sized to anticipate any projected future growth in this materials stream.

Beyond acceptance of eWaste at RTSs, the County would need to secure contracts with one or more eWaste haulers and recycling contractors to transport the eWaste from the RTSs to its recycling destination. The County will work with contractors to determine cost for these services to inform a cost-benefit analysis.

RTSs will likely need to be re-permitted to allow for acceptance of eWaste. The County will look into the requirements for permitting and consider the time and effort for permit applications to be developed, processed, and ultimately for a permit to be issued.

If the aforementioned factors do not pose significant barriers to acceptance of eWaste at RTSs, a cost-benefit analysis will be performed using the aforementioned factors and data to determine overall feasibility of the initiative.

Evaluate Residential Disposal Bans on Electronic Waste if it is Feasible to Accept at RTSs

Electronic waste is still a part of the disposed waste stream, as noted in Section 2. To promote proper handling of eWaste, the County will consider a ban on disposal of residentially generated monitors, TVs, desktops, and printers if it is found feasible to accept eWaste at the RTSs. This would prohibit eWaste from being disposed of at the landfill and require alternative recycling options.

7. Public Education

7.1 Purpose

The purpose of Section 7 is to identify the public education and information components associated with successfully implementing the Plan.

7.2 Background

7.2.1 Legislative

Per HRS Section 342G-26(g), the public education and information component of the Plan should describe the programs that the County will use, in coordination with the efforts of the HDOH, to do the following:

- Provide comprehensive and sustained public notice of the options for alternative source reduction, recycling and bioconversion, and for the proper handling of household hazardous and special wastes.
- Distribute information and education materials regarding general solid waste issues through the media, schools and community organizations.

7.2.2 Current Public Education Activities

Education activities currently used by the County are summarized in Section 1. These include promotion on the radio and through print media, County involvement in public events and surveys, collaboration with state and local schools, and an accessible-to-all webpage that provides summaries of available waste and recycling programs and printable posters.

7.3 Enhancement Opportunities

This section provides opportunities the County will consider for enhancing the effectiveness of public education activities. Implementation of these opportunities will be dependent on securing the required staff resources and funding.

7.3.1 Promote True Cost of Solid Waste Programs

The County can improve their public education program through the promotion of the true cost of solid waste programs. This would help illuminate the difference between the actual cost of a service and the amount that is collected for the service. As an example, the cost of providing collection of solid waste costs significantly more than is charged to the customer. The remainder must be subsidized using the County's General Fund. Another example of true cost information that would be valuable and of interest to the public would be the cost of landfilling. Promotion of this information could be done through the development and distribution of printed (and electronically available) materials that provide the public with an increased awareness and understanding of the true cost of solid waste disposal and recycling. The use of graphic visual representations of information, data, or knowledge presented in a way that allows for quick and clear transmission to the reader (also known as infographics) can be used in the development of public education material and posted on the County webpage. The County could complete an assessment and prepare a printable handout to post on the County webpage that graphically represents the true cost of collection and landfilling (both in terms of the economics and the environment) to convey to the public why they should participate in Reduce, Reuse, and Recycle (3R) programs. These handouts can also be made available at public events. A news release could be broadcasted that refers the public to information on the County website. In addition to being a helpful resource to the public, this information will help policymakers when evaluating changes to solid waste fees. These activities would require additional staff time to assess and implement.

7.3.2 Enhance the School Reduce, Reuse, and Recycle (3R) Program

Continued collaboration with schools is a cornerstone of the education program for the County. The County will continue to work with public schools to encourage and support enhancement of their 3R programs, including the following:

- Encouraging schools to retrofit drinking fountains with water bottle fillers and ban bottled water sales on school campuses to encourage faculty and students to use reusable drinking bottles.
- Provide schools with information on best practices to reduce paper usage.
- Develop and distribute materials that target mixed paper source reduction and waste prevention at school.

7.3.3 Evaluate a Food Waste Comprehensive Program and Use Compost and Food Waste Survey to Help Guide Needs

As discussed in Section 4, the County will evaluate and develop some level of Food Waste Comprehensive Program. For this program to be successful, the County will need to promote and educate participants in how and why they should participate. The County's webpage includes information and strategies for food waste reduction that will need to be updated with summaries of the new initiatives. The web-based surveys that are currently used for home composting can also be updated to better reflect food waste. In addition, the food waste surveys that were recently conducted with select businesses within the County should be used to help identify program needs.

Similar to the local Save the Food initiative developed by the County, printable promotional material will need to be available on the County's website and Facebook page, and advertised through print media (such as newspaper fliers and on buses). In support of the Food Waste Comprehensive Program, the County should seek proposals for new ways to reduce and divert food waste through a competitive grant program. Promotion and solicitation for the grant program would also serve as an advertisement for the overall Food Waste Comprehensive Program.

7.3.4 Update County Website with an Increased Number of Image-Based Posters and Videos

As part of the continued development and improvement (for example, making items easier to find) of the County's website,¹⁰¹ the County will enhance and increase the number of available videos and image-based posters on its webpage. The videos could demonstrate such activities as how to recycle/compost, the benefits of recycling/composting, the waste and recycling collection process in the County, operations in a recycling facility, how recycling is done wrong, and how recycling works. Videos may also be a good method for addressing topics with known challenges such as the contamination in used motor oil and mis-sorting or preparation (for example, 9-volt batteries are not taped properly) mishaps to avoid for the household battery program. The image-based signs have shown to be successful at the KRC for providing simple and clear information about programs, additional topics should be addressed using this method.

7.3.5 Promote State Green Recognition Program

The County will support and promote State of Hawai'i run programs, such as the Hawai'i Department of Business, Economic Development & Tourism Green Business Program,¹⁰² on the County's website. The Hawai'i Green Business Program assists and recognizes resorts and hotels, offices and retail spaces, restaurants and food service facilities, and green events that aim to operate in an environmentally and socially responsible manner.

¹⁰¹ County of Kaua'i. n.d. Division of Solid Waste. <https://www.kauai.gov/PublicWorks/SolidWaste>.

¹⁰² State of Hawai'i. n.d. Hawai'i Green Business Program. <http://greenbusiness.hawaii.gov/>.

7.3.6 Develop and Support a Recycling Block Leader Program

The County will work to develop and support a Recycling Block Leader Program. Recycling block leaders are volunteer recycling advocates who work to educate and inspire the groups and individuals within their circle of influence to participate in 3R programs and implement 3R behaviors and practices. The recycling block leaders would be trained through either in-person or online classes offered by the County on their website and/ and/or the Department of Parks and Recreation at a neighborhood center. The education component could also include tours of recycling centers, compost facilities, and the landfill to learn firsthand how these facilities and systems operate.

Graduates of the Recycling Block Leader Program will focus on sharing their knowledge by identifying and engaging in projects, activities, or functions that allow them to interact and make an impact in their own neighborhoods, workplaces, families, and peer groups. They will also be good candidates for helping the County at public workshops, meetings, fairs, and other public events, such as running booths at the Kaua'i County Fair and Garden Fair. In addition, through the Recycling Block Leader Program, the County could sponsor recycling events similar to the existing HHW events that would allow residents to drop off hard-to-recycle materials (for example, Styrofoam, eWaste, or film plastic) directly with the recyclers. The program would rely on recycling block leaders to promote and run the events. A good example of how trained recycling advocates have taken their training and turned it into well-organized events is the work being done by a group of master recyclers in Hillsboro, Oregon, who started organizing and hosting Planet Con events (to recycle hard-to-recycle items) and have since started their own 501(c)(3) called Westside Planet Alliance.

This type of program is very successful in a variety of locations. There are Recycling Block Leader programs in Minneapolis, Minnesota and Raleigh, North Carolina that could serve as good templates. Recycling Block Leader Programs are also similar to Master Recycling Programs. Portland, Oregon, has a long-standing and very effective Master Recycling Program that could also inform development of a Recycling Block Leader Program for the County. Both Recycling Block Leader and Master Recycling programs involve classes and training focused around source reduction and recycling. The primary difference is that recycling block leaders focus on their specific circle of influence and require less formal coordination from the program organizer (for example, the County), whereas master recyclers typically have a broader focus and require more coordination from the program organizer. There are many versions of Recycling Block Leader Programs and Master Recycling Programs throughout the country.

7.3.7 Allocate Appropriate Resources to Hire New Staff for Public Outreach and Education

A key element of expanding public outreach and education is having the appropriate resources (budget and staff) to support these programs. While some program enhancement opportunities can be done with little or no funding (such as promoting the State Green Recognition Program), the majority will need new funding to support successful development and implementation. For planning purposes, we have assumed an additional \$130,000 per year for additional resources (to be staffed as the County sees fit, to provide additional materials and services) for the public outreach and education programs. These additional staff would be separate from the additional resources discussed in Section 4, Recycling and Bioconversion. Estimates of new funding requirements are provided in Section 12.

7.3.8 Use Business Survey Process to Advertise Education Needs and Focus Areas and then Target Businesses that may Require Technical Assistance

In an effort to improve commercial waste reduction and recycling, the County should use the results from the survey that was recently employed at select businesses to distribute targeted information to those business. The survey results can also be used to advise public education needs and focus areas for educational material. The County will also institute a Peer-to-Peer Mentoring Program for businesses. The Mentoring Program could offer incentives to businesses that have great recycling practices if they mentor other businesses interested in improving their recycling program.

8. Materials Marketing and Procurement

8.1 Purpose

The purpose of Section 8 is to provide background on current and past recycling market development efforts in the County, summarize current markets and marketing practices, and evaluate future options.

8.2 Background

8.2.1 Legislative

HRS 342G requires that county integrated solid waste management plans include a marketing and procurement of materials element. More specifically, HRS Section 342G-26(i) requires that this component describe the following:

- Existing County, state, or other markets for materials diverted from the solid waste stream.
- Methods to increase access to markets, including the promotion of local uses for materials derived from solid waste.
- Methods to promote the procurement of recycled materials by County agencies.

This section addresses these requirements and broadly covers recycling market development practices and options for consideration by County officials and stakeholders. The overriding goals of recycling market development are to:

- Promote the long-term vitality of recycling programs by increasing demand for recovered materials, increasing market revenue, and/or improving marketing practices.
- Provide additional benefits such as creating local jobs, strengthening local businesses, and increasing waste diversion levels and associated environmental benefits.

8.2.2 Current Market Challenges

In the current recycling market available to the County, and Hawai'i as a whole, the sale of recycling is insufficient to offset the costs of processing and collection of materials.¹⁰³ This situation is at least partly the result of the unique challenges affecting development of markets for recyclables in the county and State of Hawai'i. These challenges were summarized in a 2017 document prepared for a different jurisdiction (the City and County of Honolulu), however they are also relevant to Kaua'i, including the following:

- **The county's and state's remoteness and resulting high transportation costs**—Shipping a standard-sized container of recyclable materials from Honolulu to Asia could cost six times the amount for shipping from Los Angeles to Asia.¹⁰⁴ Because of high transport costs, local processors receive significantly less return for their materials.
- **Lack of competition among shipping lines** —There is relatively little competition among the limited number of shipping companies that service Hawai'i and are capable of inter-island/continental transportation service. As a result, there is little incentive for those companies to offer their customers reduced freight charges for shipping containers with recyclables.¹⁰⁵
- **Low supply and demand for recyclables**—The county generates a relatively low volume of recyclables and has a relatively low demand for end products made from recycled materials on the

¹⁰³ City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program*. Report No. 17-06. October.

¹⁰⁴ Ibid.

¹⁰⁵ Ibid.

island. Therefore, for most commodities, it would not be cost-effective to develop manufacturing facilities to make products from recycled materials locally.¹⁰⁶

- **High costs**—The county faces relatively high costs for land, water, and electricity. Even if manufacturing plants existed on Kaua'i, it would be difficult for Kaua'i manufacturers to compete with those on the mainland.¹⁰⁷

In addition, given Kaua'i's lack of local recyclable material end users, the economics of recycling programs within the County are significantly impacted by fluctuations in global recycling markets (as discussed in Section 4). As such, Kaua'i was especially impacted by the change in availability to the Asian market when China stopped accepting post-consumer recyclables from other nations in January 2018.

8.3 Existing Programs and Markets

The County, the State, and commercial recyclers and processors are all key participants in Kaua'i's overall post-consumer materials management system. They each play an important role in the general market for recycled materials.

The County's role in the post-consumer materials management system focuses on developing and implementing programs and policies to guide the capture of materials, as well as contracting with recyclers/processors to manage post-consumer materials after collection. The County also encourages the procurement of recycled materials and promotes local use by showcasing recycled-content products (for example, park pavilion made from recycled plastic blocks).

The State's role in the post-consumer materials management cycle is similar to the County's in that it dictates policy and implements additional programs (such as the HI5 program) to encourage diversion of waste material from the landfill. This affects the type of materials entering the post-consumer materials market.

Generally, Kaua'i's recyclables are currently marketed to Asian regions (excluding China) with the exception of HI5 glass which is sent to California for remanufacturing in to new bottles and non-HI5 glass which stays on Kaua'i and is used in construction, landscaping, art, and other projects.¹⁰⁸ The exact end destination for each commodity changes depending on market prices, contamination restrictions, and who is accepting material at the time. This section summarizes the existing markets as of FY 2019 within the County, State, and commercial sectors, as well as activities that are being conducted to promote local use of post-consumer materials and procurement of goods made with recycled content. Sections are organized by material type.

8.3.1 Paper

There are two categories of paper that are recycled in the County: mixed paper and corrugated cardboard (also referred to as OCC). Paper as a recycling category is also known as "fiber" in the industry. Mixed paper and OCC are collected in the Kaua'i Recycles program and the commercial recycling drop-off at GID's facility in Līhu'e. In addition to these programs, the County has an ordinance that restricts commercially generated cardboard from being disposed at the landfill.

Both the residential and commercial paper streams end up at the GID facility. GID then markets the paper. GID is the only permitted recycling facility on-island with the capacity to bale and ship recyclable materials to market. In FY 2019, approximately 4,700 tons of paper were marketed, of which, 83 percent was OCC.¹⁰⁹ Some OCC and office paper may also be marketed by certain commercial firms such as

¹⁰⁶ City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program*. Report No. 17-06. October

¹⁰⁷ Ibid.

¹⁰⁸ County of Kaua'i. 2020. *Recycling Programs*. Accessed April 27, 2020. <https://www.kauai.gov/Recycling>.

¹⁰⁹ County of Kaua'i. 2019. C9518 Tracking and Kaua'i Recycles Program Contract No. 9453/9748 Annual Report, June 1, 2018 to June 30, 2019.

home supply stores or institutions. As of FY 2019, GID shipped OCC and mixed paper by barge to brokers in O'ahu, who then shipped the materials to off-island markets, in Asia. Off-island markets for paper demand low contaminant levels, and pricing has fallen significantly in the past few years. In FY 2019, OCC pricing averaged \$51 per ton and GID had to pay to have mixed paper recycled at an average price of \$20 per ton. This is significantly lower than average prices received in FY 2014 and FY 2015, \$122 for OCC and \$70 for mixed paper, respectively, when material was accepted by China with a higher level of acceptable contamination. Markets for paper continue to be extremely variable.

Hawai'i State procurement laws (in particular, HRS Section 103D-1005) followed by the County, encourage State agencies to give preference to bidders who use recycled-content materials, and to "ensure, to the maximum extent economically feasible, the purchase of materials that may be recycled or reused when discarded, and to avoid the purchase of products deemed environmentally harmful." Since 2011, the County has required that all bulk purchases of office paper have a minimum of 30 percent post-consumer content.

The key barriers to enhancing paper marketing are related to the County's remoteness and small population. On-island market development of paper manufacturing facilities is not an option. Although some quantity of paper may be used in innovative, cottage scale uses such as old newspaper in animal bedding and shipping applications, such uses are not likely to use large quantities and may never reach as high a price as the open market, notwithstanding high transportation costs.

Opportunities to enhance paper marketing include identifying lower cost transportation alternatives (for example, through backhauling), focused efforts to reduce contamination levels, and increased cooperation in recycling among the County and other counties in state to strengthen the negotiating position in the marketplace. According to the 2016 Waste Characterization Study, paper is the second highest most common material class in the County's waste stream disposed at the landfill. At 18.4 percent of the overall waste stream, opportunity exists for further targeted market development efforts for paper.

A summary of paper market programs is provided in Table 8-1.

Table 8-1. Paper Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	PAYT Kaua'i Recycles Drop bins Regulations guiding recycling (landfill restrictions on commercially generated cardboard)	Regulations requiring purchase of recycled paper products	Off-island paper mills to make recycled paper and cardboard products (for example, toilet tissue, paper towels, office paper, paper bags, paperboard, new cardboard, and cardboard medium) Shipment to Asia for recycling and processing into recycled paper and cardboard products
State		Regulations requiring or encouraging purchase of recycled paper products	
Commercial	Commercial recycling contract with recycling facility Backhaul programs at large box stores and chains	None	

8.3.2 Glass

There are two categories of glass that are recycled from Kaua'i, HI5 glass and Non-HI5 glass or ADF glass. Generally, glass is collected in the residential drop bins that are part of the Kaua'i Recycles program, commercial drop at GID's facility in Lihue, or at the HI5 redemption centers. Glass collected from both the residential and commercial programs are taken to the GID facility (this does not include the

HI5 glass that is collected from the redemption centers). HI5 glass (from the redemption centers) is sent to California and non-HI5 glass is crushed into a course 3/8-inch cullet at GID and is available for a variety of on-island uses like glasphalt or some glass art products. The crushed glass typically has no value. In FY 2019, GID marketed and shipped approximately 1,660 tons of recycled HI5 glass to manufacturers on the mainland and received \$9 per ton.¹¹⁰

The State oversees the HI5 program for various types of DBCs, including glass containers. As part of the HI5 program, a 5-cent deposit and 1- to 1.5-cent non-refundable fee are assessed with the purchase of each DBC. The 5-cent deposit is returned upon redemption. More information on the HI5 program is provided in Section 1.

The State's ADF program for non-deposit glass has undergone a series of changes since its inception in 1994. Through this program, the State provides funding to the County to issue a recycling incentive payment to glass processors. Beginning in FY 2018, the County decided to forfeit ADF funds because the amount of money the County receives to subsidize non-deposit glass recycling is insufficient to cover all the costs associated with receiving, processing, and managing a buy-back and recycling program as required by the HDOH. More information on the State's ADF program is provided in Section 1.

The key barriers to strengthening on-island recycled glass markets are the lack of mainstream acceptance of recycled glass in beneficial reuse applications (for example, mud abatement, landscaping, drainage medium, base course, and glasphalt), the lack of processing capacity for consistently high-quality supplies of finely ground glass, and the high cost of processing. For off-island markets, there is no financial incentive for recyclers to accept the material, as the current subsidy does not offset the costs to recycle. The main barrier to enhancing off-island marketing of recycled glass is the high cost of transportation, along with the lack of an on-island processing infrastructure. A threat to the long-term vitality of on-island glass recycling is the small number of firms involved in processing and using glass.

A summary of glass market programs is provided in Table 8-2.

Table 8-2. Glass Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	PAYT Kaua'i Recycles Drop bins	None	Craft industry Shipment to the mainland for recycling into glass bottles Material for mud abatement, landscaping, drainage medium, and base course
State	Non-deposit glass ADF funds (forfeited by County starting in FY 2019) HI5 Deposit Program	Regulations allowing use of crushed glass in road construction	
Commercial	Commercial recycling contract with recycling facility On-island reuse programs	None	

8.3.3 Metals

Puhi Metals, operated by Resource Recovery Solutions, LLC in Līhu'e, is responsible for processing and marketing scrap metals, white goods, tin/steel cans, and depressurized propane tanks. The company ships these materials directly to O'ahu for processing, and ultimately to markets on the mainland. Although swings in price and demand for scrap metal are inevitable, there is likely to continue to be sufficient off-island demand for all materials recovered. In FY 2019, Puhi Metals received 4,884 tons of scrap metal including appliances and vehicles. EH International and Reynolds Recycling purchased approximately 300 tons of non-ferrous metals including copper, brass, and aluminum in 2016.

¹¹⁰ County of Kaua'i. 2019. C9518 Tracking and Kaua'i Recycles Program Contract No. 9453/9748 Annual Report, June 1, 2018 to June 30, 2019.

The State oversees the HI5 program for DBCs, including aluminum and bi-metal containers. As part of the HI5 program, a 5-cent deposit and 1- to 1.5-cent non-refundable fee are assessed with the purchase of each DBC. More information on the HI5 program is provided in Section 1. Currently all redemption center operators are transporting the redeemed DBCs to GID in Līhu'e for processing and marketing. Steel and bi-metal cans received by GID through the residential drop bin program are brought to Puhī Metals for marketing. GID ships aluminum containers to the mainland and Asian markets. In FY 2019, GID marketed and shipped approximately 140 tons of aluminum for an average price of \$1,101 per ton.¹¹¹

No significant barriers exist to continued off-island marketing of metals, though as with other recyclable materials, recyclers would benefit from reduced transportation costs that may potentially be attainable through identification of backhaul or other opportunities.

A summary of metal market programs is provided in Table 8-3.

Table 8-3. Metal Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	PAYT Kaua'i Recycles Drop bins Commercial recycling contract with recycling facility Free residential scrap metal recycling at multiple locations	None	Recycled metal Shipment to the mainland and Asia for recycling/processing into metal products
State	HI5 Deposit Program	None	
Commercial	Regulations guiding recycling (landfill restrictions on commercially generated scrap metal)	None	

8.3.4 Plastics

There are a multitude of post-consumer plastics that are not recyclable. At this time, only #1 and #2 plastic bottles and jars are accepted in the County's programs. Recycled plastics on Kaua'i are primarily collected through the HI5 program and the residential drop bin program. As with glass and metal containers, plastic DBCs can be redeemed through the HI5 program administered by the State. More details on the HI5 program are provided in Section 1.

Polyethylene terephthalate (PET, #1) and high-density polyethylene (HDPE, #2) plastic bottles and jars are currently marketed by GID, which handles materials collected at the DBC redemption centers and the County drop bin locations. In FY 2019, approximately 360 tons were marketed. These materials are shipped directly to plastics re-processors in Asia, under coordination with a mainland broker. Off-island markets for plastic resins have been shifting and becoming more restrictive of contaminant levels, and pricing has fallen significantly in the past few years. In FY 2019, DBC plastic from Kaua'i sold for an average of \$113 per ton. This is significantly lower than average price of \$326 received in FY 2015 when post-consumer recyclables were accepted by China with a higher level of acceptable contamination.

Plastic pallet wrap is also backhauled by large retailers.

Throughout the state and on Kaua'i, a cottage industry of plastic recycling is popping up and providing opportunities that did not previously exist. For example, the County has been approached by several entrepreneurs (such as Precious Plastic Recycling Machines, ByFusion, and DOW).

¹¹¹ County of Kaua'i. 2019. C9518 Tracking and Kaua'i Recycles Program Contract No. 9453/9748 Annual Report, June 1, 2018 to June 30, 2019.

Due to the low volume of recovered plastic in the County and statewide, developing reclaiming capacity is not an option. The main barriers to enhancing off- island markets for recycled plastic involve the low volume and the need to keep plastic covered, clean, and dry prior to marketing full container loads, the remoteness of Kaua'i, and the difficulty in achieving low contaminant levels in plastic bales.

A summary of plastic market programs is provided in Table 8-4.

Table 8-4. Plastic Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	PAYT Kaua'i Recycles Drop bins Ban	None	Shipment to Asia for recycling/processing into recycled plastic products (for example, bottles made from recycled plastic, insulation, carpet, clothing, and plastic furniture) Small local plastic processing using Precious Plastic Machines.
State	HI5 deposit program	None	
Commercial	Backhaul programs at large box stores and chains Commercial recycling contract with recycling facility	None	

8.3.5 Green Waste

Approximately 27,000 tons of green waste was generated in FY 2019 and processed at four facilities in the County: Kaua'i Nursery & Landscaping, Heart & Soul Organics, Green Earth Matters, and DMK Associates. These firms produce mulch and compost products, which they sell to landscapers and residents, and use in their own operations. Demand for their products is apparently adequate, though stronger demand and the ability to sell at a higher value would greatly benefit these operations and could lead to increased diversion of organics.

The green waste market is limited to on-island customers (this is not a commodity that will be shipped off-island). Barriers to the market include space constraints for processing material and limited customers. Opportunities to strengthen the organics market include assisting producers to enhance the quality of their product through use of additional nutrient-rich feedstocks and targeted cooperative marketing and promotion efforts aimed at potential large quantity buyers such as County agencies and agricultural operations.

A summary of green waste market programs is provided in Table 8-5.

Table 8-5. Green Waste Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	Drop-off locations at County RTSs for residents Free home composting bins for residents Contract with a composting facility	Free mulch to residents	Processing of green waste into compost, mulch, soil amendment products, and compost filter socks for sale throughout Hawai'i
State	None	None	
Commercial	Regulations on commercially generated green waste disposal Tipping fee at compost facilities is less than at the landfill	None	

8.3.6 Used Oil

Kaua'i's used motor oil and oil filters are shipped by Unitek to their facility on O'ahu. There, the used oil is filtered and sold for use as fuel in a utility boiler, and the filters are cleaned and sold as scrap metal to a processor on the mainland. Demand is sufficiently strong for these materials. In FY 2019, Unitek processed 64 tons of used motor oil from Kaua'i. Kaua'i Grease Traps is the only company in the County that collects used cooking oil from businesses. They conduct this service for a fee in conjunction with grease trap servicing. The used cooking oil is sold to a company on O'ahu that recycles it into biodiesel fuel.

The State mandates that commercially generated used oil must be handled through a recycling company. The State promotes markets for used cooking oil and biodiesel by developing policies that guide usage. For example, HRS Section 103D-1012 provides for a 5-cent per-gallon price preference for 100 percent biodiesel and "for blends containing both biodiesel and petroleum-based biodiesel, the preference is to be applied to only the biofuel portion of the blend."

Barriers to the market include a limited market for biodiesel.

A summary of used-oil market programs is provided in Table 8-6.

Table 8-6. Used-Oil Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	Residential used motor oil and filters acceptance at all RTSs and the landfill Contract with used motor-oil recycler	None	Recycling of used oil into re-refined motor oil Recycling of oil filters Processing of used cooking oil into biodiesel and other fuels and animal feed
State	Regulations on used-oil recycling Regulations promoting the use of biodiesel	None	
Commercial	None	None	

8.3.7 Tires

Unitek Solvent Services, PS&D Tires, and E-H International are responsible for marketing scrap tires. Tires are either barged to Unitek's facility in O'ahu or shipped to processors on the mainland, with some limited markets present in the state. Tires can be retreaded and used again, shredded for TDF, or crumbed for use in artificial turf or athletic applications; however, these are limited markets on the islands. In FY 2019, approximately 516 tons of tires were accepted for recycling in Kaua'i.

The State requires tire retailers and wholesalers to accept used tires in exchange for new ones purchased, and typically prohibits the disposal of whole, used motor vehicle tires at all landfills and incinerators within the state. All scrap tires derived from commercial and government entities are required to be properly disposed and recycled in accordance with state regulations.

Demand is expected to be steady. Barriers to strengthening scrap-tire demand include the limited market and applications on-island.

A summary of used tire market programs is provided in Table 8-7.

Table 8-7. Used Tires Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	Residential used tire acceptance at County RTSs and the landfill Contract with a tire recycler	None	Shipment to the mainland for recycling or processing into retreaded tires, TDF, and crumb rubber (for use in artificial turf or athletic applications)
State	Regulations on retailers and wholesalers to accept used tires Regulations banning tires from landfill disposal or incineration	None	
Commercial	Regulations banning tires from landfill disposal	None	

8.3.8 Electronics

eWaste is accepted for recycling at the Puhī Metals Recycling Center, free of charge. The program is open to residents and businesses with no restrictions on quantity. In FY 2019, approximately 197 tons of eWaste was accepted for recycling at Puhī Metals. Collected items are shipped off-island.¹¹²

In 2008, the State adopted the Hawai'i Electronic Waste and Television Recycling and Recovery Law (HRS Chapter 339D) requiring electronics manufacturers to provide recycling programs for electronic devices and televisions. Manufacturers must take covered electronics back at no cost to residents when dropped off for recycling.¹¹³ As of January 1, 2010, consumers can recycle their covered electronic devices through these programs. As of January 1, 2011, consumers may recycle their covered TVs through these programs.¹¹⁴

According to the 2016 report to the state legislature, the total amount of eWaste recycled has increased from 3,235,432 pounds in 2010 to 4,235,276 pounds in 2014.¹¹⁵ The report also notes that although the amount of eWaste that is recycled has slightly increased, the overall effectiveness of these programs is impacted by how convenient the programs are for customers. For instance, some programs only accept limited types of eWaste and are confusing for customers.¹¹⁶

With the rise of technology, the landscape for electronics recycling is shifting. Some notable trends in electronics are that devices are becoming more lightweight and integrated (weight becomes an ineffective measure of recycling program effectiveness), as well as the decline in usage of precious metals and other valuable materials housed in devices.¹¹⁷

Barriers to electronics market development in the County include the low volume and generally poor economics of recycled electronics processing and electronics repair.

¹¹² County of Kaua'i. n.d. Electronics Recycling. <https://www.kauai.gov/eWaste>.

¹¹³ State of, Department of Health. 2020. "Electronic Device and Television Recycling Law." <http://health.hawaii.gov/ewaste/>. Accessed May 5, 2020.

¹¹⁴ State of Hawai'i, Department of Health. 2010. March. *Hawai'i Electronic Waste and Television Recycling and Recovery Law*. <http://health.hawaii.gov/ewaste/files/2013/06/consumer.pdf>. Accessed May 5, 2020.

¹¹⁵ State of Hawai'i, Department of Health. 2015. *Report to the Twenty-Eighth Legislature State of Hawai'i 2016*. December. http://www.bottlebill.org/resources/pubs/2016_OSWM_Annual_Report.pdf. Accessed May 5, 2020.

¹¹⁶ State of Hawai'i, Department of Health. 2015. *Report to the Twenty-Eighth Legislature State of Hawai'i 2016*. December. http://www.bottlebill.org/resources/pubs/2016_OSWM_Annual_Report.pdf. Accessed May 5, 2020.

¹¹⁷ Resource Recycling. 2017. "Landscape View." September 19. <https://resource-recycling.com/e-scrap/2017/09/19/landscape-view/>.

A summary of electronics and eWaste market programs is provided in Table 8-8.

Table 8-8. Used Electronics Market Overview

Market Sector	Existing Methods to Encourage Recycling and/or Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets and End Products
County	Free acceptance at Puhi Metals Source reduction and recycling campaigns	None	Recycled electronic components
State	Regulations on used electronics disposal Regulations on manufacturers to take back electronics (EPR)	None	
Commercial	Free acceptance at Puhi Metals Source reduction and recycling campaigns	None	

8.3.9 Other Materials

Additional waste materials that could potentially be targeted in market development efforts include:

- C&D Materials – According to the 2016 Waste Characterization Study, inerts and other C&D is the most prevalent material class in the County’s overall waste stream with over 19,800 tons disposed annually at the landfill (23.7 percent of overall waste stream). Some C&D materials such as dry wall/gypsum, pallets, and untreated wood could be used in compost or mulch, and pavement and stone can be crushed and reused as aggregate. Other C&D materials may be salvaged for reuse. Half of the material observed in this category for the 2016 Waste Characterization Study was clean lumber (5.0 percent of overall waste stream) and other wood waste (6.2 percent of overall waste stream). Other wood waste includes untreated/unpainted scrap from production of prefabricated wood products such as furniture or cabinets, and untreated or unpainted wood roofing and siding. Both of these categories could potentially be captured for use in compost or mulch.
- Plastic Film – According to the 2016 Waste Characterization Study, over 3,400 tons of non-recyclable plastic film (also includes pallet wrap) and bags are annually disposed (4.1 percent of the overall waste stream). This tonnage decreased by 2,000 tons from the 2006 Waste Characterization Study, which indicates the Plastic Bag Ban has had some success, however, plastic film is still in the top ten most prevalent material types in the overall Kaua’i waste stream. Currently no processors for these materials are located in Hawai’i. Big box stores backhaul pallet wrap.

8.4 Enhancement Opportunities

This section provides opportunities the County will consider for enhancing the effectiveness of materials marketing and procurement activities. Implementation of these opportunities will be dependent on securing the required staff resources and funding.

8.4.1 Explore Potential for Plastic Processing Innovations

The County Division of Solid Waste staff will work with a consultant to explore the potential for plastic processing innovation. One example of this is creating something like ByFusion blocks. ByFusion is a New Zealand-based company that makes construction-grade building material (ByBlock) made entirely from recycled plastic waste. According to the company’s website, the ByBlocks are good for non-loading bearing walls, retaining walls, sound walls, sheds, privacy fencing, terracing and landscaping, accent walls, and furniture.¹¹⁸ In 2019, Kaua’i opened a new athletic pavilion built with ByBlock that is the first building the United States to use the material. Unfortunately, there is not a local ByBlock producer.

¹¹⁸ ByFusion. 2020. <https://www.byfusion.com/>.

There are other innovative processes that could be of potential interest to the County, such as Precious Plastic technologies. Ideally, the County will be able to find a right-sized technology that can be easily brought to Kaua'i and then used to help process select plastics into locally marketable products; therefore increasing the procurement of recycled materials by the County.

8.4.2 Advance County Recycled Product Purchasing Policy

The County will advance the existing state recycled product purchasing policy (HRS 103D-1005) within local government agencies and look for more opportunities for these types of purchases. HRS 103D-1005 encourages county agencies to follow the state recycled product procurement policy; however, the County is not procuring a significant amount of recycled-content products because 103D-1005 only encourages counties, rather than mandates, them to do so. Doing more to follow this policy would promote stronger recycling markets through the broad purchase of recycled products in all facets of County operations.

The County could serve as a model by increasing the emphasis on source reduction and reuse in its procurement policies. All County offices could expand the use of bulk purchasing, material reuse, and other waste prevention measures by allowing for a price preference or other incentive for County Departments to select products that accomplish these objectives.

Procurement policies at the local level can generally be structured in one of three ways:

- The least effective is to offer a preference for recycled products, but without a price preference or specific specification to purchase recycled. The current County policy is an example of this approach, and many other local and state governments have adopted similar policies.
- A somewhat more effective approach is to offer a price preference. For example, certified recycled products may be given a 5- or 10-percent price advantage during competitive bid solicitations. This approach can lead to greater purchasing than a mere preference policy, but still is problematic because purchasers and bidders may not respond because bids are often adjusted to the solicitation terms and may lead to higher priced purchasing in general. Another form of price preference is to provide a source of funding to cover the difference between recycled products and conventional products. This can be an effective approach but requires an incentive to encourage or mandate use of recycled products, and also requires a funding source.
- The most effective recycled product procurement policy is generally acknowledged to be a direct, unambiguous adoption of bid specifications to require recycled product use. This approach can lead to the lowest price recycled products and provides by far the most effective market signal to trigger increased investment and interest among vendors.

The County will evaluate its purchasing specifications to identify opportunities to change bid specifications to provide a clear preference for recycled-content products. The federal bid specifications can serve as a guide for this effort. The evaluation will analyze the potential price implications. The County Division of Solid Waste could also promote the recycled product purchasing policy by working with the Division of Purchasing to complete a Green Procurement Plan for use by all County agencies or completing a County-level procurement policy. Resources to help with recycled product purchasing and creating polices are available from the National Association of State Procurement Officials (NASPO).¹¹⁹ As a NASPO member, the State of Hawai'i, receives Green Purchasing Technical Assistance Funds (GPTAF) on annual basis to support state green purchasing initiatives and programs. The County could work with the State Procurement Office to determine if funding is available to support County initiatives.

8.4.3 Evaluate On-island Recycling Opportunities and Issue RFPs for Select Materials

The County will continue to evaluate opportunities for beneficial reuse of recyclables on-island especially for particularly hard-to-recycle and/or hard-to-market materials (that is, dry materials and organics). One potential way to provide new opportunities for hard-to-recycle materials is to issue RFPs to investigate

¹¹⁹ National Association of State Procurement Officials. 2020. *Green Purchasing Resources*. Accessed April 27, 2020. <https://www.naspo.org/greenresources>.

beneficial on-island recycling markets for select materials. The purpose of the RFPs is to gather information on and ultimately implement new management techniques so that these materials can be beneficially reused, which will promote access to markets and local reuse of materials. If beneficial reuse technologies could be implemented for any of these materials, the County would be successful in supporting new markets as well as diverting waste from landfill. The County should work with other counties in the state, such as Honolulu, to determine if they have had any successes with RFPs that had similar intentions.

8.4.4 Promote State Compost Standards

The County will support and promote State of Hawai'i compost standards. To help support these efforts, the County will review and comment on State changes. Once standards are revised, the County will add links on the County web site to State compost standards and will incorporate information into their composting education efforts. This goal can be achieved with additional County resources.

8.4.5 Improve County Use of Recycled Glass, Organics and Other Recycled Products

The County will work to improve use of recycled glass, organics, and other recycled products on-island.

For organics, this will include facilitating an expanded range of materials that can be used in on-island compost and mulch production, including gypsum, pallets, food waste, and other organic materials.

The current landscape for non-deposit glass recycling requires immediate legislative attention. In the past few years, various bills have been introduced at the state legislature that would directly or indirectly result in increased funding for the State's ADF glass recycling program, but none have passed. The County has attempted to develop an ADF glass program, but the current funding level provided by the State is not sufficient to cover all costs involved in receiving, processing, and managing a buy-back and recycling program as required by the HDOH. Because of the low recycling incentive payment offered by the State, there are no public options for recycling non-deposit glass. With limited recycling options and no anticipated changes to the ADF, the County will continue to advocate for an increase in the ADF and to collaborate with the HDOH for a solution considering the status of non-deposit glass programs. More information on the State's ADF program is provided in Section 1.

8.4.6 Promote Enhanced State and Federal Market Development Efforts and Funding

The County will support and promote enhanced State of Hawai'i and federal market development efforts and funding. This goal can be achieved with additional County staff.

9. Refuse Transfer Stations and Landfills

9.1 Purpose

The purpose of this section is to assess the adequacy of the County's RTSs and disposal facilities based on existing solid waste management needs, and to project future facility needs based upon anticipated changes in the waste stream. This section also includes an overview of the process used by the County to site new solid waste management facilities and a summary of the County's Enterprise Zones.

9.2 Legislative Background

Per HRS Section 342G-25(c), the facility capacity and siting element shall include descriptions of existing facility capacity and future needs, facility implementation tasks, and enterprise zones. HRS Section 342G-27 further details the information to be included within each component, as follows:

- Existing capacity and future needs: Identify existing and future facilities needed for solid waste management.
- Facility implementation: Describe the specific tasks that are necessary to provide for the development or expansion of source reduction, recycling, bioconversion, and disposal facility capacity.
- Enterprise zones: Describe the County's current and planned actions to establish enterprise zones.

In addition to the facility capacity and siting element, Section 9 addresses the following HRS Section 342G-26(h) requirements for the landfill and incineration component of the Plan:

- Assess the county's current landfill capacity and ways to extend that capacity.
- Assess the availability of land for future landfills.

Note that the County does not currently dispose of any solid waste via incineration; therefore, the following HRS Section 342G-26(h) requirements are not applicable and are not addressed in Section 9:

- Estimate the amount of waste currently going into incineration facilities and the remaining available capacity.
- Estimate the quantity of ash generated at incineration facilities.
- Describe provisions for ash disposal.

9.3 Refuse Transfer Stations

9.3.1 Existing Refuse Transfer Stations

RTSs play an important role in the County's waste management system, serving as a link between a community's waste collection program and a final disposal facility. The primary reason to use RTSs is to reduce the cost of transporting waste to disposal facilities. This is achieved by consolidating smaller loads from household collection vehicles into larger transfer vehicles enabling collection crews to spend less time traveling to and from distant disposal sites and more time collecting waste. The RTSs also allow residents to properly dispose of MSW, green waste, and specified recyclable materials on days other than their scheduled collection days.

Commercial businesses and other non-residential entities are required to use pre-purchased coupons to dispose of MSW and green waste at the County's RTSs. Coupon fees for non-residential customers are presented in Table 1-7. Although cost effectiveness will vary, RTSs generally become economically viable when the one-way hauling distance to the disposal facility is greater than 15 to 20 miles. However, it should be noted that transportation conditions (that is, traffic, road quality, size of vehicles used and collection routing) will impact the benefit of direct-haul versus consolidating refuse at an RTS. As shown in Table 9-1, only one of the County's existing RTSs is less than 15 miles from the landfill.

Table 9-1. One-Way Distances from Existing RTSs to the Kekaha Landfill (miles)

RTS	Distance To Kekaha Landfill
Hanalei	61
Hanapēpē	9
Kapa'a	36
Līhu'e	28

Additional information regarding existing RTS facilities and operations is presented in Section 1.9.

9.3.2 Enhancement Opportunities

This section describes enhancement opportunities identified to improve RTS operations.

9.3.2.1 Assess Closure of RTSs and the Kekaha Landfill, 1 Day per Week

The County will assess closure of the RTSs and Kekaha Landfill 1 day per week with the aim of improving operational efficiency. Closure of these facilities 1 day per week could lower overall costs by reducing staff overtime and equipment downtime. The County's residential and commercial collection service does not operate on the weekends so closing on a weekend day would be advantageous in that area, but County residents tend to use the RTSs more on the weekends, so further assessment of the advantages and disadvantages would be needed prior to making a final determination. It is estimated that the County could save about \$144,000 annually by closing the RTSs and the landfill 1 day per week.

9.3.2.2 Enhance Staff Training Program

The County will enhance the current RTS staff training program with the goal of improving compliance with drop-off restrictions. RTS staff training is completed periodically; however, non-compliance with certain drop-off restrictions remains an issue for the County (for example, commercial use, pressurized tanks, and used-oil collection). Improving compliance with these restrictions will reduce lost revenue from disposal of commercial refuse without payment of tip fees and costly disposal of contaminated or prohibited materials.

9.3.2.3 Propose an Increase to Commercial RTS Tipping Coupon Fees

The County will propose increasing the RTS tipping coupon fees commercial customers are required to pay to dispose of MSW and divert green waste at the County's RTSs. The tipping fee coupon rates at the RTSs have not changed since 1997. In the meantime, the landfill tipping fees and the cost of hauling waste to landfill, including equipment, labor, and fuel, have increased. The County will assess the current cost to service commercial customers at the RTSs and will propose an ordinance for a fee to subsidize the increased costs.

9.3.3 Future Needs

This section includes an assessment of RTS capacity and future needs based on projected increases in waste received at the RTSs over the 10-year planning period (through 2030). Table 9-2 presents the annual permitted capacity of each RTS, total waste received at each RTS in 2019, and projected waste receipts for 2030. Annual permitted capacity is based on the daily average solid waste receipt limit set forth in the solid waste management permit for each RTS and the operating days per year (7 days per week, excluding holidays). Projected 2030 waste receipt values are estimated based on 2019 waste receipts and a total growth percentage derived from projected 2019 and 2030 tonnages presented in Table 2-4.

Table 9-2. Capacity Analysis for RTSs

Facility	Annual Permitted Capacity (tons) ^a	2019 Receipts (tons) ^b	2030 Projected Receipts (tons) ^c	Projected Receipt Exceeds Permitted Capacity
Hanapēpē	12,320	7,956	9,259	No
Līhu'e	14,080	15,572	18,122	Yes
Kapa'a	14,080	9,158	10,658	No
Hanalei	10,560	6,561	7,635	No

^a Annual permitted capacity is based on the permitted capacity of 35 tons per day (Hanapēpē), 40 tons per day (Līhu'e and Kapa'a), and 30 tons per day (Hanalei) set forth in the current RTS solid waste management permits, multiplied by 352 operating days per year. Note that the RTSs close for 13 public holidays.

^b 2019 Receipt encompasses quantities collected in FY 2019, presented in Table 1-7.

^c 2030 Projected Receipt tonnages are based on a total growth percentage of 16.38 percent, derived from projected 2019 and 2030 tonnages presented in Table 2-4, applied to tonnages in the 2019 Receipts column. To be conservative, the projected receipts do not include any effects from additional source reduction and recycling efforts.

Currently, the quantities of waste accepted at the Hanapēpē, Kapa'a, and Hanalei RTSs are well within the permitted capacities, and these RTSs are not expected to exceed permitted capacities within the next 10 years. The County may need to modify its solid waste management permit to address current and future tonnages at the Līhu'e RTS.

9.4 Kekaha Municipal Solid Waste Landfill

9.4.1 Existing Kekaha Landfill

The Kekaha Landfill is located on the leeward coastline of Kaua'i near the town of Kekaha. It is currently the primary solid waste disposal site on the island. The Kekaha Landfill consists of two disposal areas (Phase I and Phase II). The Phase I area is a closed, unlined landfill with an estimated 1,717,245 cubic yards of waste in place. The Phase II area is a RCRA Subtitle D lined landfill consisting of the original Phase II (32.1 acres), the Cell 1 lateral expansion (6.4 acres), and the Cell 2 lateral expansion (6.6 acres). The Phase II landfill is currently permitted to an elevation of 120 feet above mean sea level.¹²⁰

The Cell 2 lateral expansion was permitted in September 2019 and provided an estimated additional 972,500 cubic yards of gross airspace.¹²¹ The capacity of the original Phase II and Phase II, Cell 1 is estimated at 3,358,159 cubic yards,¹²² for a total Phase II estimated capacity of 4,330,659 cubic yards.

The Kekaha Landfill is owned and operated by the County. Prior to December 2019, Landfill operations and monitoring services currently managed by the County were contracted to WMH.

A breakdown of the materials disposed at the landfill in FY 2019 is presented in Table 1-8. The current tipping fees paid by the private haulers and other commercial vehicles at the landfill are presented in Tables 1-8 and 1-9. Materials not accepted at the landfill are also outlined in Section 1.10.

9.4.2 Emergency Operating Procedures

Since taking over landfill operation, the County has worked to further develop emergency operating procedures with the aim of allowing safe, uninterrupted operation through most weather events. To

¹²⁰ Hawai'i State Department of Health, Environmental Management Division. 2019. Solid Waste Management Permit No. LF-0042-16.

¹²¹ Ibid

¹²² Waste Management of Hawai'i, Inc. 2019. 2019 Annual Operating Report, Kekaha Sanitary Landfill, Phase II. July 31.

prepare for the rain and moderate wind associated with typical storm conditions, the County stockpiles wet weather material (6-inch minus rock and sand). The material is deployed during storm events to allow for safe entry of trucks at the tipping floor and continued operation of the landfill in wet weather.

In addition, the County has developed and adopted a new Kekaha Municipal Solid Waste Landfill Emergency Management Plan to address potential operational impacts associated with extreme weather events. Due to climate change, the frequency and severity of extreme weather events is increasing. The Landfill Emergency Management Plan includes both proactive and corrective measures to improve the resilience of landfill operations and minimize operational impacts associated with extreme weather events.

The Landfill Emergency Management Plan covers general Environmental Control Systems (ECS) management, proactive actions County staff will take to reduce potential damage to the ECS ahead of extreme weather events, and corrective actions County staff will implement in the event that extreme weather events damage the ECS. The ECS includes landfill gas management, leachate control, groundwater monitoring, surface water management, and landfill cover and liner. The plan identifies proactive and corrective measures to address potential impacts associated with heavy rainfall, hurricanes, earthquakes, and tsunamis.

9.4.3 Kekaha Landfill Remaining Existing Capacity

The remaining capacity of the permitted landfill is tied to the remaining airspace, the future rate of waste received, and the amount of compaction achieved.

Per the Kekaha Landfill 2020 Annual Operating Report,¹²³ the remaining Kekaha Landfill Phase II permitted airspace was 619,067 cubic yards as of June 27, 2020. The report estimates that the landfill would reach capacity in June 2027, which is approximately 6.5 years from January 2021. The County is planning a vertical expansion of the landfill, which is estimated to increase the remaining life by 3 years and 5 months. With the vertical expansion, Kekaha Landfill is expected to reach capacity in November 2030.

The County is using two strategies to extend the life of the existing permitted capacity, as follows:

- 1) This landfill capacity estimate assumes current waste diversion: to the extent the County is successful implementing diversion programs, the remaining landfill capacity can be extended.
- 2) In 2020, the County purchased a new landfill compactor and global positioning system (GPS) infrastructure that will improve the utilization of the remaining airspace at the Kekaha Landfill.

The County will monitor its remaining capacity annually to assess the extent to which these strategies are effective in extending the life of the landfill's existing permitted capacity.

9.4.4 Vertical Expansion to Increase Kekaha Landfill Capacity

Because of the high costs and other challenges associated with siting, permitting, and constructing a new landfill, the County is planning a vertical expansion of the Kekaha Landfill.

A vertical expansion could add an additional 65 feet, to a new maximum elevation of 185 feet mean sea level entirely within the current footprint of Phase II, and would provide approximately 3 years and 5 months of capacity. Final design of the vertical expansion will require full engineering analyses including slope stability analyses to confirm the feasibility of the proposed expansion. Permitting and design work for the proposed vertical expansion is anticipated to begin in FY 2022.

¹²³ Geosyntec Consultants. 2020. *Kekaha Municipal Solid Waste Landfill and Kekaha Materials Drop-Off Facility Annual Operating Report July 1, 2019 through June 30, 2020*.

9.5 Facility Siting Process

9.5.1 Purpose

The purpose of the siting strategy is to provide a fair and objective process by which solid waste management facilities may be sited. This strategy seeks to address the concerns of all interested parties. The final decision on sites for facilities will be recommended by the Mayor and approved by the Kaua'i County Council.

According to HRS Section 342G-27, all county solid waste management plans shall contain a siting element for solid waste management facilities used for source reduction, recycling, bioconversion, and disposal facility capacity. Revisions will be made to the siting strategy to incorporate changes in law.

Note that the New Kaua'i Landfill Siting Study Report indicates that the 2012 landfill siting project was conducted in general accordance with the following process.

9.5.2 Principles

Flexibility will be required in the siting process. While affording this latitude, the following principles will be the basis for applying the siting process:

- During preliminary site evaluations all potential sites shall be considered
- Site selection must be a process fully open to all to foster trust in the process
- The potential impact upon property values and quality of life both for individuals and neighborhoods adjacent to a solid waste facility must be fully acknowledged
- Negotiations are the preferred method to resolve issues
- Prior to any decision, there must be full research and disclosure of all facts and proposals
- The need for the proposed facility, its impacts, and the results of not siting the facility must be considered by all parties in the negotiations
- The County must plan, and act, in advance of need, that is, avoid crisis management. This may include hiring a public outreach firm
- It is essential that all parties have access to information and that mediation be used for dispute resolution when direct negotiations are unsuccessful
- The word "public" has many, often separate, meanings including governments, neighborhoods, and individuals, but all types of interests should be considered
- All final decisions shall reside with the Mayor and Kaua'i County Council

9.5.3 Site Selection Process

The proposed site selection process will be comprised of the four following stages:

- Stage 1 – Establish a Siting Task Force.
- Stage 2 – Identify “Excluded Sites” and Develop County-specific Siting Criteria.
- Stage 3 – Define Ranking Criteria and Rank Available Sites.
- Stage 4 – Select Preferred Sites.

Figure 9-1 presents an overview of the process.

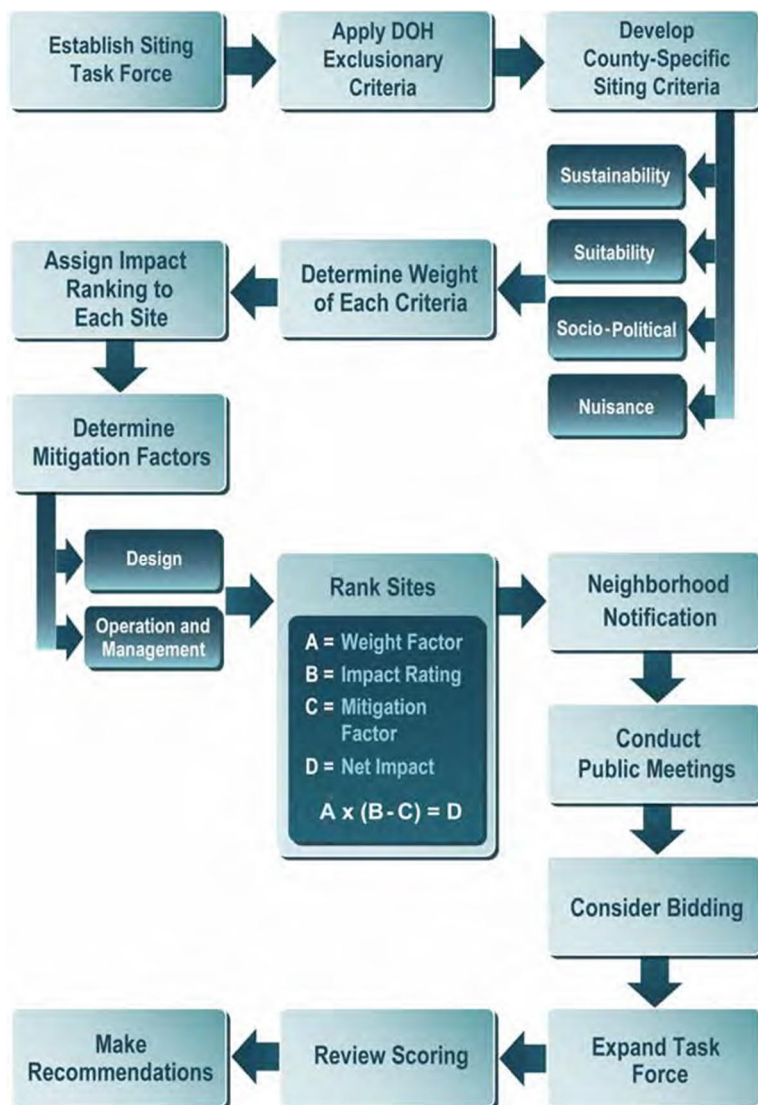


Figure 9-1. Siting Strategy Process

Source: County of Kaua'i, Department of Public Works – Solid Waste Division. 2009. County of Kaua'i Integrated Solid Waste Management Plan.

9.5.4 Stage 1 – Establish Siting Task Force

Stage 1 encompasses the formation of a Siting Task Force that will conduct the siting process. In addition to members of the Task Force being appointed, decisions regarding how and who will conduct mediation, if necessary, and the pertinent preliminary information that the Task Force will use to make its recommendations will be compiled.

The County will provide the Task Force with support and assistance in making site recommendations for facilities through extensive public involvement. The Mayor and County Council will appoint the members of the Task Force, who will include but not be limited to representatives of the following:

- County Agency representatives, such as the Planning Department and Economic Development Department.
- Representatives from Kaua'i communities.
- Environmental and neighborhood organizations.
- Kaua'i cultural groups.
- Business community.

- Public.
- Waste industry representatives.
- SWAC representatives.
- HDOH representative(s).

These individuals will comprise the core of the Siting Task Force. Other members will be added when the process becomes more site-specific. The County will provide staff assistance and consultants as required and approved by the Mayor and County Council.

9.5.5 Stage 2 – Identify Excluded Sites and Develop County-specific Siting Criteria

9.5.5.1 General

During the implementation phase of the County's Plan, the County will require the use of siting criteria for all new, solid waste facilities. These criteria would assist in narrowing the number of possible areas to potential sites for further consideration under Stage 3. The criteria are divided into exclusionary and ranking categories.

9.5.5.2 Eliminate Excluded Sites

The exclusionary criteria can be those that are mandated by the EPA and the HDOH or are County-specific. County government or a County representative will work with the County's Planning Department and use a Geographic Information System to apply the exclusionary criteria to all areas of the island to eliminate these sites from further consideration. These areas will most likely include the following special management areas:¹²⁴

- Tsunami inundation areas.
- Areas within 1,000 feet of shoreline.
- Federal government lands.
- Areas within 100-year flood zones.
- Wetland areas.
- Areas with unacceptable topography, slope 33.33 degrees.
- Areas within 1,000 feet of water well.
- Areas within 300 feet of perennial streams.
- Areas within 1,000 feet of surface area.
- State conservation lands.
- Areas within 0.5 mile of urban lands.
- Areas within 10,000 feet of airport runways.
- Areas within 0.5 mile of schools, hospitals, and residences.¹²⁵

9.5.5.3 Develop County-specific Criteria

The Task Force would then develop County-specific siting criteria for areas of the County that are not excluded based on the EPA and HDOH siting regulations. The process of developing County-specific criteria may involve multiple meetings of the Task Force. These County-specific criteria would be applied separately for each facility.

The County-specific criteria will be divided into four general categories: sustainability criteria; suitability criteria; socio-political criteria; and nuisance criteria. These criteria will be applied to all solid waste facilities. These criteria could include but would not be limited to the elements discussed in the following sections.

¹²⁴ Prior to beginning the siting process for a solid waste management facility, the County will review Federal, State and local regulations to identify the most recent exclusionary siting criterion.

¹²⁵ HRS Section 342H-52(b)

Sustainability Criteria

- Endangered Species – Sites would minimize the effect on the habitat of known rare or endangered species.
- Screening – To the extent practical, natural screens such as trees and topography would be used when selecting sites.
- Aquifer Location – Aquifers would be considered when locating facilities. The potential impacts on aquifer and public water supplies would be evaluated.
- Air Quality – Sites would minimize adverse impacts on air quality. Such factors as buffer zone distances, natural air currents, prevailing winds, and facility design should be considered with relation to air quality especially for landfills and composting facilities.
- Archeology – Sites would not impact known archeological or historical locations. For example, a facility may not be sited in a known archeological or historic location, but additional traffic near the location may adversely impact its integrity.
- Cost – The cost of acquiring and develop property for a will impact the ability of that facility to operate in a cost-effectively and compete in the market place.

Suitability Criteria

Suitability criteria encompass those aspects having to do with the location, size, shape, use, and accessibility of the site.

- Site Location – While still satisfying other criteria, the facility would be located as close as possible to the waste generation areas to minimize the transportation of waste. For areas with widely dispersed waste generation, a system of facilities may be more economical, using RTSs to service a single solid waste management facility or siting more than one waste management facility. Environmental and/or public opinion factors may outweigh the economic savings of such a location and require a more remote site.
- Traffic – Sites would minimize congestion and adverse safety effects of facility traffic on the existing traffic flows in the vicinity of the site. Turning functions, site distance from areas of heavy traffic, congestion, facility traffic volume, noise, and aesthetics are examples of factors to consider.
- Accessibility – The facility should be easily accessible from major roadways. The number and type of trucks and transfer vehicles that would be using the facility should be considered. Transporting waste through residential or commercial areas would be minimized. Good access from appropriate roads will minimize impact on residential streets, reduce impact on normal traffic flow, and lower transportation time and expense.
- Site Size and Shape – Sites would be large enough for the facility buildings and structures, construction areas and open space buffer areas. There would be sufficient space to accommodate such elements as optimum vehicle movement, parking areas, queuing space, and private vehicle/truck separation.
- Land Availability – Sites would be readily available for acquisition at a reasonable cost. Preferably site acquisition would not require condemnation of properties.
- Single Ownership – Sites would be comprised of a single piece of property to limit the number of parties involved.
- Existing Land Use – Sites would be located a reasonable distance away from residential, community, and commercial development. However, the site would be conveniently located.
- Existing Zoning – Site use would be compatible with existing zoning.
- Access to Utilities – Sites would have ready access to required utilities. These would include electricity for purchase and sale of power (as appropriate), potable water, process water, wastewater disposal, and telephone. Utilities would have adequate capacity to supply the facility with its design requirements.

- Access to Markets – Convenient access to the markets for materials recovered at a facility may be an important factor, depending upon the type of facility and the materials. Market determination is usually based on the market value of the material and the transportation cost to markets.
- Topography – Sites would have topographic characteristics which are compatible with the type of facility being sited.
- Soils – Soils of the site should be adequate to support structures, roads and highways without adverse impacts or excessive costs. Some soils types and properties may make development of a site difficult due to excessive costs or difficulty in providing adequate structural support.

Socio-Political Criteria

- Impact on Surrounding Areas – Sites should cause minimal environmental or economic impacts (including impact on property values) on surrounding areas. Public opinion could be a major factor in the relative importance of this criterion.
- Environmental Justice – No sites should place an excessive environmental burden on a particular race, color, national origin, or income group.

Nuisance Criteria

- Noise – Sites should have a minimum adverse impact on noise levels in surrounding residential or other noise-sensitive areas. Noise levels may result from traffic to and from the facility, construction and operation of the facility. Attempts should be made to maintain background or ambient levels.
- Dust – Depending upon facility type, if dust is a factor to be considered, topography and prevailing winds should be considered.
- Odor – Where odor may be a problem, potential sites should be situated so as not to exacerbate the problem due to common temperature inversions, topography or prevailing winds.

9.5.6 Stage 3 – Define Ranking Parameters and Rank Available Sites

9.5.6.1 General

Available sites would be ranked relative to one another to assist the Task Force in developing its recommendations to the County Council. The system would compare the suitability of sites for a particular type of facility.

Because the County criteria are broad-based in nature and apply to the siting of all types of solid waste facilities, a scoring system would be used. This system would allow the Task Force to develop a ranking on a facility-specific basis. It permits some factors to be given greater influence than others.

After determining the weight factor for each of the criteria, an impact rating would be assigned. The impact ratings are site-specific and provide a relative measure of how the various criteria would be affected for each site.

Mitigation factors are those aspects that lessen the impact rating. These mitigation factors may come about as a result of guidelines for operational procedure for each type of facility or as part of the compensation package agreed upon during the bidding process. These mitigation factors are divided into three general categories: operations and management, design, and compensation. These factors could include but are not limited to those in the following sections.

Operations and Management

- Traffic routing.
- Traffic safety devices.
- Traffic safety enforcement.
- Street cleaning.

- Nuisance (for example, odor control, dust, litter control).
- Wheel washing.
- Right for local inspection.
- Commitment to ongoing communications with neighbors.

Design

- Landscaping/berming.
- Final land use plan.
- Local ordinance compatibility.
- Fencing.
- Development of non-fill areas.

Compensation

- Host community fees.
- Development of public buildings or infrastructure.
- Complementary services (that is, no charge to use the facility).

9.5.6.2 Scoring and Ranking

For each criteria, the weight factor (A) would be multiplied by the difference between the impact rating (B) and the mitigation factor (C) to determine the net impact (D). The formula is as follows:

$$A \times (B - C) = D$$

The Net Impact scores would be totaled to provide an overall impact. This process would be duplicated for each potential site.

The Task Force would consider the overall impact and then recommend preferred sites. These sites would be recommended to the Mayor and County Council for consideration.

County staff or their representatives would meet with neighbors and community representatives associated with the potential sites. The County would provide written detail on the specifics of the proposed facility including purpose, design, construction, capacity, operational procedures, and performance guarantees.

9.5.7 Stage 4 – Selecting Preferred Sites

To narrow the list of available sites to the most appropriate and preferred site(s), the County would complete the following tasks:

- 1) **Neighborhood Notification:** The County would transfer information and explanation of site selection process to those where potential sites for future solid waste management facilities exist.
- 2) **Public Meetings:** Public meetings would be conducted to explain HDOH exclusionary criteria and County-specific siting criteria. Residents and property owners within a reasonable distance of the site(s) would be notified, invited, and encouraged to attend Task Force meetings.
- 3) **Bidding:** Any group, community, private entity, or land owner may initiate this offering, or bidding process. This offer should not be vetoed outright by others. If no offers are presented, the Task Force would review other potential areas for sites.
- 4) **Weighting and Scoring:** The Task Force would select weighting values for the County criteria. The weighting values are facility specific with the value for identical criteria remaining the same for each site.
- 5) **Expand Task Force:** Representatives from the political jurisdictions most directly affected shall be added to the Task Force by the Mayor.
- 6) **Review of Scoring:** The Task Force would review scoring, based upon additional information provided through the public meetings and the expanded Task Force.

- 7) Recommendations: The Task Force would recommend preferable sites to the County Council based on the application of the criteria.

9.5.8 Mediation Process

Non-binding mediation would be used to help avoid and resolve conflicts, disputes, and impasses associated with siting of solid waste facilities. A mediator or otherwise disinterested third party would be brought into the siting process to assure all sides that their views and inputs will be fairly considered. The mediator would act as a link for opposing interests, fostering communications, and encouraging cooperation. The mediator would clarify issues and concerns, offer constructive suggestions, possible compromises, and potential solutions.

A mediator should be used when the parties need help in establishing communications. The mediator may be used under circumstances when:

- Excessive personal time on the part of Task Force members or County would be demanded.
- The direction of a negotiated outcome is contrary to current County policy.
- The parties need help in establishing communication.
- Special group process skills are needed.
- Sensitive information is involved.
- Fresh ideas/potential solutions are needed.
- Negotiations are threatened by disagreements within groups.
- An aspect of the process is not working.

A mediator would be selected by the County, with the recommendation of the Task Force, at the beginning of the siting process. This would help assure that the siting process is evenly and fairly addressed. One basis in which the mediator would be selected is impartiality.

The mediation process would be helpful for difficult issues. The preferred way to avoid an impasse is to have a mediator address issues before conflict arises. The County Public Works Department would develop lines of communication with interested parties and would coordinate the selection process. The County Public Works Director would be charged with identifying the various interest groups and incorporate them into the selection process.

9.5.9 Recent Siting Efforts

Recognizing the dwindling Kekaha Landfill capacity and need to accommodate solid waste generated by residents and visitors on Kaua'i, the County commissioned an MSW landfill siting study in 2000. The study was published in March 2001 and identified seven potential future landfill sites. A supplementary evaluation covering an eighth site proposed after publication of the 2001 study was published in 2002.¹²⁶

In 2007, the County of Kaua'i Mayor's Advisory Committee on Landfill Site Selection (MACLS) was convened to develop new community-based criteria for selecting a new MSW landfill site for Kaua'i. The MACLS met nine times between May 2008 and April 2009 and developed 26 community criteria, weighted according to perceived importance. The potential landfill sites identified by the 2001/2002 siting studies were then ranked by the MACLS based on the new criteria and weighting factors. The MACLS report was published in May 2009 and included commissioned studies on Environmental Justice and Host Community Benefits.¹²⁷

A new landfill siting study was completed in 2012 to re-evaluate the suitability of the eight previously identified sites and provide additional analyses to allow the County to select a proposed landfill site. The New Kaua'i Landfill Siting Study Report contains technical, environmental, cultural, and social comparisons of the sites, including: a State Landfill Criteria Evaluation, a Preliminary Engineering Evaluation, planning-level cost estimates, the results of the 2012 Community Criteria Evaluation, an

¹²⁶ AECOM Technical Services, Inc. 2012. New Kaua'i Landfill Siting Study Report. July.

¹²⁷ Ibid.

analysis of other critical decision, and conclusions and recommendations. The siting study concluded that all eight sites were technically and legally feasible, but recommended the Ma'alo site based on consideration of all siting criteria.¹²⁸

A draft environmental impact statement was prepared in 2018 to evaluate the environmental impacts of developing a new MSW landfill and resource recovery park at the Ma'alo site (north of Līhu'e town, oceanward [*makaī*] of Ma'alo Road). Public meetings were held in May 2018 to provide information on the draft environmental impact statement and accept public comments.¹²⁹

Sections 10.2.2 and 10.2.3 present additional information regarding siting of a new MSW landfill, including planning-level cost estimates.

9.6 Enterprise Zones

The Hawai'i State Legislature established enterprise zones in HRS Section 209(E) to stimulate business, agricultural, and industrial growth and increase employment in economically challenged areas. The State offers tax exemptions and other incentives to businesses willing to locate in enterprise zones and provide employment in these designated areas. In addition to State benefits, legislation requires that counties offer their own incentives.

State tax benefits are available to eligible businesses for up to 7 consecutive years and include the following:

- 100 percent General Excise Tax exemption on eligible revenues.
- 80 percent non-refundable State income tax credit the first year, with the percentage declining by 10 percent each year for 6 more years.
- Additional non-refundable income tax reduction equal to 80 percent of annual unemployment insurance premiums the first year, with the percentage declining by 10 percent each year for 6 more years.¹³⁰

In addition, the County offers the following incentive to eligible businesses in enterprise zones:

- Priority business permit processing.¹³¹

Each county may nominate up to six areas as enterprise zones for a period of 20 years, with each area consisting of one or more adjoining census tracts. To qualify for enterprise zone designation, an area must meet low-income or high unemployment criteria based on the latest U.S. census data per HRS Section 209(E)(9).

There are currently four designated enterprise zones in Kaua'i County, as shown in Table 9-3 and on Figure 9-2.

Table 9-3. Designated Enterprise Zones

Enterprise Zone	Effective Date	Expiration Date
North Shore Kaua'i	9/19/2016	9/18/2036
Kapa'a	9/19/2016	9/18/2036
South Central Kaua'i	9/19/2016	9/18/2036
West Kaua'i	9/19/2016	9/18/2036

¹²⁸ AECOM Technical Services, Inc. 2012. New Kaua'i Landfill Siting Study Report. July.

¹²⁹ County of Kaua'i. 2020. New Landfill Site. <https://www.kauai.gov/NewLandfillSite>.

¹³⁰ DBEDT. 2018. "State of Hawai'i Enterprise Zones (EZ) Program." <https://invest.hawaii.gov/business/ez/>

¹³¹ Ibid.

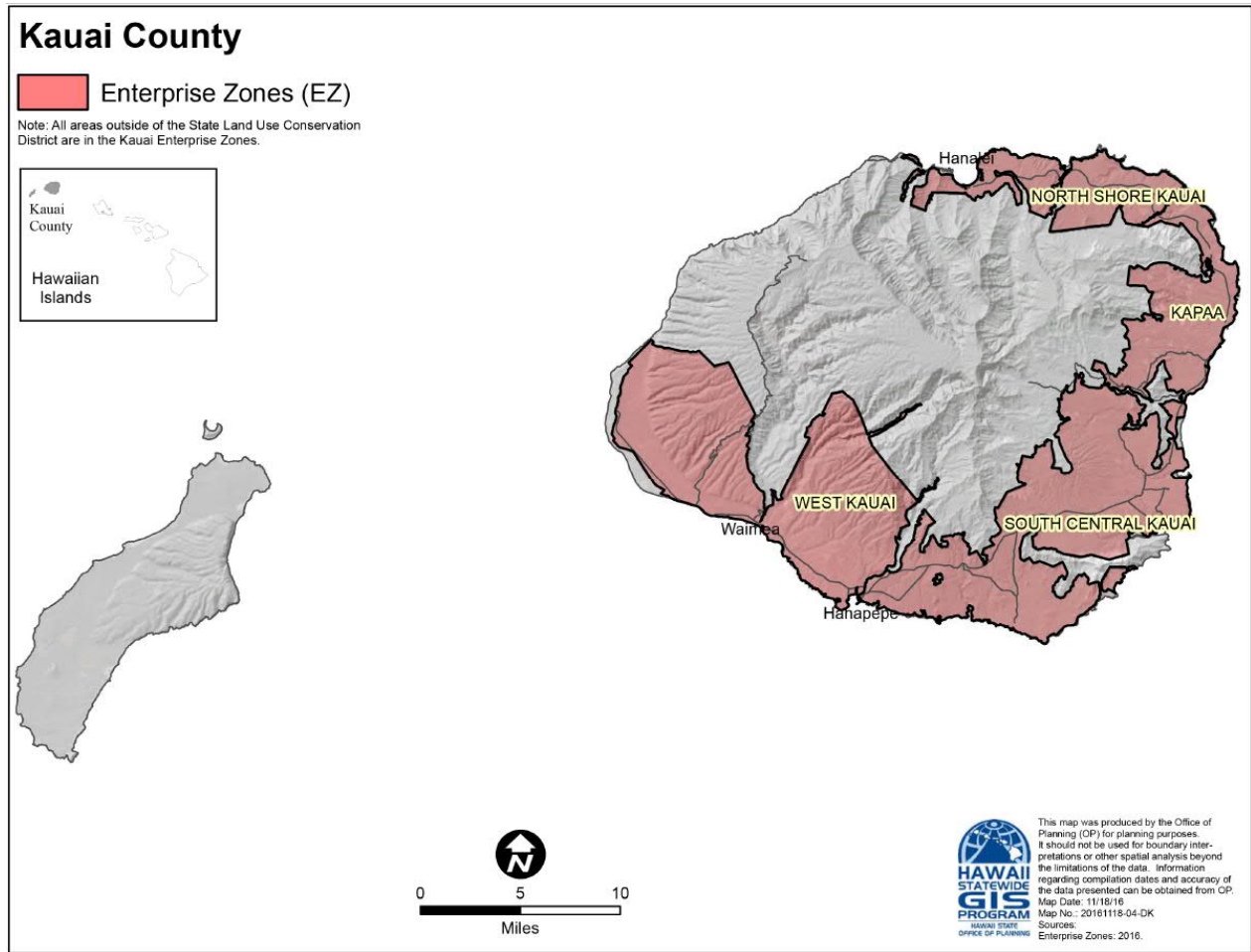


Figure 9-2. Enterprise Zones

Source: Hawai'i Statewide Office of Planning, Hawai'i Statewide GIS Program. 2016. Honolulu County. http://invest.hawaii.gov/wp-content/uploads/2012/05/ez_kauai.pdf.

The type of solid waste-related business that may be appropriate for development in an enterprise zone would likely be one that processes or manufactures materials, such as an MRF, a composting facility, or a facility used for manufacturing products from recycled materials. Businesses seeking enterprise zone status are required to submit an application for approval from the State of Hawai'i Department of Business, Economic Development, and Tourism. The tax and permitting incentives offered in enterprise zones could be an important factor in the financial feasibility of future solid waste projects in the county.

10. Evaluation of Long-Term Disposal Options (30-year Time Horizon)

10.1 Background

The County of Kaua'i Solid Waste Division is responsible for managing solid waste generated by residents and visitors on Kaua'i. This responsibility includes assessing current waste management practices, identifying potential waste management options, and developing a short-term (next 10 years) and long-term (30 years) waste management strategy. The short-term strategy (discussed further in Section 9.4.3) is to continue using the Kekaha Landfill and potentially increase the capacity of that landfill by vertical expansion. This section describes the long-term disposal strategy. Even though the majority of this ISWMP covers a 10-year planning horizon, the longer-term strategy is covered at a high level for planning purposes, considering adjustments in disposal infrastructure or plans can take many years to actualize and will need to be at least identified, selected, and initiated during the 10-year planning horizon. Other sections of this Plan identify waste prevention, recycling, and composting programs the County has already undertaken or intends to implement to reduce the amount of waste requiring disposal. Even if the County significantly reduces disposal needs through upstream diversion, final treatment or disposal methods (or both) will be required to manage waste that cannot be reused or recycled in any other way.

This section provides an evaluation of potential treatment and disposal options the County may consider to meet long-term waste disposal needs. As the existing landfill nears capacity, the County will need to identify, select, and initiate one or more of these options.

Disposal categories and specific options identified for assessment include the following:

- Subtitle D Landfill:
 - Develop Proposed Ma'alo Road Landfill.
 - Develop New Landfill on Kaua'i at Location Other Than Ma'alo Road.
 - Mine Closed Kekaha Landfill.
- Conventional Waste-To-Energy:
 - Develop On-Island Mass Burn or Refuse-Derived-Fuel (RDF) Waste-To-Energy Facility.
- Alternative Technologies to Landfill:
 - Anaerobic Digestion, Including Co-Digestion.
 - Pyrolysis/Gasification.
 - MSW Aerobic Composting.
 - Mechanical-Biological Treatment (MBT).
 - Chemical Recycling.
- Waste Export:
 - Waste Export to H-POWER or Hawai'i County Landfill.
 - Waste Export to Mega Landfills on West Coast of Mainland U.S.

The evaluation for each option (except for alternative technologies, which is done slightly differently) includes background information, discussion of advantages and disadvantages, and a planning-level cost estimate. Section 10.6 includes a comparison of potential disposal options and summary of the County's long-term disposal strategy.

10.2 Subtitle D Landfill

Historically, the County has used MSW landfills to dispose of solid waste generated on Kaua'i. MSW landfills, which are specifically designed to receive household waste and other types of nonhazardous

wastes, are regulated under RCRA Subtitle D. Subtitle D contains federal requirements for the management of nonhazardous waste (40 CFR 239 – 259).

As described in Section 9.4, the Kekaha Landfill is currently the only active Subtitle D landfill on Kaua'i and is projected to reach capacity by November 2030 assuming a vertical expansion (as described in Section 9) is completed. Section 9.5 outlines the facility siting process that would be used to site a new Subtitle D landfill, as well as the County's recent siting efforts. Siting, permitting, and construction of a new landfill or other disposal option often takes 10 years or more; therefore, time is of the essence for the County to agree on its next long-term disposal option as soon as possible. The following sections describe potential long-term on-island landfill options.

10.2.1 Develop Proposed Ma'alo Road Landfill

The County's most recent landfill siting study, the New Kaua'i Landfill Siting Study completed in 2012, recommended the Ma'alo site for development based on consideration of all siting criteria.¹³² The Ma'alo site consists of a 270-acre property located north of Līhu'e town and *makai* of Ma'alo Road. The estimated total available airspace for the site is 40,964,455 cubic yards, providing an estimated site life of 264 years. The estimated landfill life for the Ma'alo site is more than double the estimated life of any other site evaluated, making it the longest-term disposal solution identified in the siting study.

One noted drawback to the Ma'alo site was the relatively high initial development cost, which was the highest of any site evaluated. There was also some concern regarding possible wetlands features that could require mitigation.

Major contributors to selection of the Ma'alo site were the long site life, which would allow the County to avoid the high costs and other challenges associated with siting a new landfill for the longest period of time, and the presence of a willing landowner, a factor that had derailed previous siting efforts.¹³³ However, the current property owner, the State of Hawai'i, has recently expressed it has other activities it would like to pursue at this site and the State of Hawai'i Department of Transportation, Airports Division (HDOT) and the FAA are opposed to using this site for a landfill because of the potential for bird strikes. Therefore, the ability of the County to acquire and develop this site as a landfill is uncertain at this time.

Site acquisition, permitting, design, and construction of a landfill at the Ma'alo Road site is expected to take at least 8 to 10 years, requiring the County to successfully implement a vertical expansion of the Kekaha Landfill or identify an interim disposal strategy prior to the availability of a landfill at this location.

The cost of acquisition, development, and operation of a landfill at the Ma'alo site is estimated to be \$85 to \$130 per ton.¹³⁴ This estimate is based on the total effective annual cost escalated to 2020 dollars divided by 2020 landfill quantities.¹³⁵

Advantages and disadvantages associated with development of a landfill at the Ma'alo site are summarized in Table 10-1.

¹³² AECOM Technical Services, Inc. 2012. New Kaua'i Landfill Siting Study Report. July.

¹³³ Ibid.

¹³⁴ Note that original cost estimates presented in this section were escalated to 2020 dollars based on U.S. Bureau of Economic Analysis historical implicit price deflator for gross domestic product for Hawai'i.

¹³⁵ AECOM Technical Services, Inc. 2012. New Kaua'i Landfill Siting Study Report. Escalation and range estimate prepared by Jacobs. 2020.

Table 10-1. Advantages and Disadvantages for Development of Proposed Ma'alo Road Landfill

Advantages	Disadvantages
Siting a new landfill on Kaua'i would ensure availability of future disposal capacity and avoid dependence on off-island disposal solutions.	Property may not be available.
Long site life would delay the need to site a new landfill or identify an alternate disposal option far into the future.	The landfill would result in an irreversible impact on a local ecosystem.
Site is economical over the life of the landfill due to economies of scale and the potential to amortize initial site development costs over a long site life.	There is a high initial development cost.
Central location would provide cost savings and sustainability benefits.	FAA requirements place restrictions on the site, and active management techniques would be required to mitigate the potential for aircraft collision with birds attracted to the landfill.
Site is ranked highest in the 2012 Community Criteria Evaluation.	Possible wetland features could require mitigation and there is a risk of damage to aquatic ecosystems that would have to be managed carefully.
Favorable local topography shields the site from creating adverse visual impacts.	Location has higher rainfall than the current landfill, which will make operations more challenging during storm conditions and would result in significant ongoing costs for stormwater management.

10.2.2 Develop New Landfill on Kaua'i at Location Other Than Ma'alo Road

If barriers to development of a new landfill at the Ma'alo site prove too difficult to overcome, the County could consider developing a new landfill on Kaua'i at another location. The New Kaua'i Landfill Siting Study evaluated seven potential new landfill sites in addition to the Ma'alo site.¹³⁶ The locations of the sites vary, with property sizes ranging from 78 to 176 acres. Estimated total available airspace for the various sites ranges from 4,032,323 to 16,164,268 cubic yards, resulting in site life estimates ranging from 26 to 104 years.¹³⁷ Six of the seven sites have site life estimates greater than 50 years, making them good long-term disposal options, with the Kalepa site having a relatively short site life of 26 years. Considering the siting study report was published in 2012, it is likely that a new siting study would be required. If the County chooses to proceed with development of a new landfill at a location other than the Ma'alo site, a new landfill siting study should be commissioned to update the information in the 2012 New Kaua'i Landfill Siting Study and provide a recommendation based on current conditions.

Siting, design, and construction of a landfill at a location other than Ma'alo Road is expected to take at least 10 years, requiring the County to successfully implement a vertical expansion of the Kekaha Landfill or identify an interim disposal strategy prior to the availability of a new landfill.

The estimated cost of acquisition, development, and operation of a landfill at a location other than the Ma'alo site ranges from \$95 to \$140 per ton.¹³⁸ This estimate is based on the total effective annual cost escalated to 2020 dollars divided by 2020 landfill quantities.¹³⁹

¹³⁶ AECOM Technical Services, Inc. 2012. New Kaua'i Landfill Siting Study Report.

¹³⁷ Ibid.

¹³⁸ Note that original cost estimates presented in this section were escalated to 2020 dollars based on U.S. Bureau of Economic Analysis historical GDP inflation data for Kaua'i (real GDP chain-type quantity index).

¹³⁹ AECOM Technical Services, Inc. 2012. New Kaua'i Landfill Siting Study Report. July. Escalation and range estimate prepared by Jacobs. 2020.

Advantages and disadvantages associated with development of a new landfill at a location other than the Ma'alo site are summarized in Table 10-2.

Table 10-2. Advantages and Disadvantages for Development of New Landfill on Kaua'i at Location Other Than Ma'alo Road

Advantages	Disadvantages
Siting a new landfill on Kaua'i would ensure availability of future disposal capacity and avoid dependence on off-island disposal solutions.	Any landfill would result in an irreversible impact on a local ecosystem.
All sites evaluated have a lower initial cost than the Ma'alo site.	All sites evaluated have a higher cost per year of site life than the Ma'alo site.
	None of the sites evaluated have owners likely to sell willingly, which has derailed previous siting efforts.
	A new landfill siting study would be required to select a site for development.
	A 10-year+ siting and landfill development process would require vertical expansion of the Kekaha Landfill and likely some additional interim disposal solution, given current Kekaha Landfill capacity.

10.2.3 Mine Closed Portion of Kekaha Landfill

In the spring of 2020, the County hired a consultant to investigate the feasibility of mining the closed Phase I area of the Kekaha Landfill and then constructing a new, lined landfill at that location.¹⁴⁰ The purpose of the feasibility assessment was to conduct an engineering, environmental, regulatory, and economic analysis of mining Phase I to gain airspace for MSW disposal when Phase II reaches its maximum disposal capacity.¹⁴¹ The hope was that by excavating the previously placed waste and separating out recoverable materials for recycling (such as metals) and soil for reuse as landfill cover, the County would be able to gain significant airspace for future landfilling. The Phase 1 Landfill Mining Feasibility Study was completed in February 2021.¹⁴²

One of the key challenges associated with landfill mining and recovery is understanding the composition of the buried waste. Waste composition records for the closed Phase I area of the Kekaha Landfill are not available and waste disposal started prior to establishment of RCRA Subtitle D landfill requirements. Where waste composition is not well understood, there is the risk of uncovering hazardous waste, finding that the quality of recoverable materials has deteriorated, or finding that less material is recoverable than anticipated. There is also a concern that landfill mining can create adverse localized environmental impacts (such as nuisance odors or leachate release) and health and safety risks.¹⁴³ All of these factors can affect the economic viability of the project and the projected costs have a wide range due to these factors.¹⁴⁴

The County does not intend to pursue landfill mining at this time due to the many remaining uncertainties, but may revisit this option at a later date if additional information becomes available or conditions change.

¹⁴⁰ Stantec. 2020. Kekaha Landfill Mining Feasibility Study Scope of Work. April.

¹⁴¹ Ibid.

¹⁴² Stantec Consulting Services Inc. 2021. Phase 1 Landfill Mining Feasibility Study: Kekaha Landfill, County of Kaua'i, Hawai'i. February.

¹⁴³ MSW Management. 2016. Landfill Mining: Current Trends. <https://www.mswmanagement.com/landfills/article/13025745/landfill-mining-current-trends>.

¹⁴⁴ Waste Management World. 2014. Landfill Mining: Goldmine or Minefield?. <https://waste-management-world.com/a/landfill-mining-goldmine-or-minefield>.

10.3 Conventional Waste-To-Energy

Development of a mass burn or refuse-derived-fuel WTE facility, paired with a new landfill, is another possible long-term disposal option for Kaua'i. Conventional WTE is part of a general category of thermochemical, biochemical, and physiochemical waste reduction methods that can be used to recover the energy stored in inert, nonhazardous, and non-recyclable waste materials. It can reduce the volume of these materials while also producing electricity and heat; these benefits may be appealing for jurisdictions with dwindling landfill airspace. Less common technologies continue to develop and are evaluated for use in a variety of locations; these alternative technologies are further discussed in 10.4.

There are more than 75 WTE facilities running in the U.S.,¹⁴⁵ including the H-POWER Covanta facility in nearby O'ahu that uses both RDF (two process trains) and mass-burn technologies (one process train).¹⁴⁶ H-POWER processes up to 3,000 pounds of MSW per day to produce 90 megawatts, which represents approximately 8 percent of O'ahu's energy needs.¹⁴⁷ The most recent new WTE facility built in the U.S. was built in Palm Beach County, Florida, in 2015.¹⁴⁸

As a long-term disposal option, sending MSW to a WTE facility would significantly reduce the volume of the solid waste; however, it would still have the byproduct of ash, residual MSW, and bypass waste. It is important to note that a WTE facility does not eliminate the need for a Subtitle D landfill, because the ash must be contained in an ash monofill and disposal capacity is needed for residual waste (MSW with characteristics not suitable for processing via WTE) or bypass waste when the facility is closed for maintenance.¹⁴⁹ It is possible for a portion of the ash to be used in beneficial reuse applications such as construction; however, this is dependent upon the waste characteristics of the ash. Typically, about 20 to 25 percent of the inbound waste stream requires landfill disposal as ash or other materials.

Either or both of pre-processing or an efficient collection system is typically used to remove recyclables and homogenize the waste feedstock to improve the WTE process. In terms of energy production, WTE is not competitive with other electricity generation methods because of the heterogeneity of elemental composition, high moisture content, and relatively low energy content of MSW (approximately 10 to 13 million British thermal units [MMBTu] per ton compared to sub-bituminous coal at 17 to 21 MMBTu per ton).¹⁵⁰ That being said, WTE is considered by the EPA to be a "clean, reliable, renewable source of energy"¹⁵¹ and would offset the dependence of fossil fuels on the island.

One challenge for WTE on Kaua'i is the successful implementation of renewable energy on the island with many hours of multiple days being powered 100 percent by renewables. The KIUC reports that in 2019, the island achieved 56 percent renewable energy generation, and during daylight hours the utility typically has sufficient renewable energy to meet demand.¹⁵² The utility would not need the baseload power provided by a WTE facility, which would substantially lower the potential for energy sale revenue and increase net operating costs compared to typical facilities. That said, it is possible that RDF could be generated and sold to other uses on-island. Based on the 2011 update to the analysis prepared in the 2009 ISWMP and other sources and considering that revenues from energy sales might be lower than in other locales, the cost for a WTE facility is estimated to be \$190 to \$280 per ton in 2020 dollars.¹⁵³

¹⁴⁵ EPA. "Energy Recovery from the Combustion of Municipal Solid Waste (MSW)." Accessed May 1, 2020. <https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw#02>.

¹⁴⁶ Hawaiian Electric. n.d. "H-POWER (Covanta Honolulu Resource Recovery Venture)." Accessed May 1, 2020. <https://www.hawaiianelectric.com/clean-energy-hawaii/our-clean-energy-portfolio/renewable-energy-sources/biomass/h-power>.

¹⁴⁷ Covanta. n.d. "Covanta Honolulu." Accessed May 1, 2020. <https://www.covanta.com/Our-Facilities/Covanta-Honolulu>.

¹⁴⁸ DOE. 2019. *Waste-to-Energy from Municipal Solid Wastes*. <https://www.energy.gov/sites/prod/files/2019/08/f66/BETO--Waste-to-Energy-Report-August--2019.pdf>.

¹⁴⁹ These wastes include certain construction and demolition debris materials and bulky items, sludge, asbestos-containing materials and aggregate.

¹⁵⁰ DOE. Op Cit.

¹⁵¹ Energy Recovery Council. n.d. ERC Industry Facts. <http://energyrecoverycouncil.org/industry-faqs/>.

¹⁵² <https://pv-magazine-usa.com/2020/04/23/kauai-was-56-renewably-powered-in-2019/>

¹⁵³ R.W. Beck. 2009. Integrated Solid Waste Management Plan. https://www.kauai.gov/Portals/0/PW_Recycling/ISWMP/ISWMP%20Report%202009%20RW%20Beck.pdf?ver=2019-10-09-145504-120×tamp=1570669207651.

Table 10-3 presents advantages and disadvantages for considering a WTE facility as a long-term disposal option.

Table 10-3. Advantages and Disadvantages for a WTE Facility

Advantages	Disadvantages
WTE significantly reduces the volume of waste disposed of in a landfill, therefore preserving landfill capacity and dramatically reducing the land needed for landfilling.	Use of WTE may influence public perception on the importance of waste reduction and recycling.
Energy production from WTE would offset reliance on fossil fuels.	WTE is more expensive than landfilling.
	Kaua'i's successful implementation of renewable power would likely result in relatively low energy sales that would increase the net disposal cost of the facility compared to typical WTE plants.
	High up-front capital costs typically require put-or-pay contracts that can increase per ton costs if diversion programs are successful.

10.4 Alternative Technology Assessment

10.4.1 Background

In addition to the long-term disposal options, there are alternative disposal technologies that could potentially manage portions of Kaua'i's solid waste stream. With input from County staff, the following five options were selected for review:

- Anaerobic Digestion, Including Co-Digestion.
- Pyrolysis/Gasification.
- MSW Aerobic Composting.
- Mechanical-Biological Treatment (MBT).
- Chemical Recycling.

These options are discussed slightly differently than the other disposal options, largely due to their less developed status. A brief description of the technology, applicability to Kaua'i's waste stream, commercial status, and risk factors are included for each of the alternative technologies discussed. Project-specific feasibility assessments are recommended prior to moving forward with any of these alternatives.

The County is in the process of contracting a consultant to assess whether alternative technologies could feasibly be used to divert waste from the landfill. While alternative technologies have been examined in the past, they are being evaluated again because technologies continue to change, and all long-term disposal options should be considered. Technologies to be assessed as part of the feasibility study include thermochemical conversion (that is, conventional WTE, pyrolysis, or gasification), physicochemical conversion (that is, RDF generation), and biochemical conversion (that is, anaerobic digestion). Based on the results of the study, the County may proceed with an RFP to further evaluate feasible technologies. The initial study of these technologies will commence in FY 2022.

10.4.2 Anaerobic Digestion, Including Co-Digestion

Anaerobic digestion is a recycling technology that breaks down the organic fraction of a waste stream by using biological processes in the absence of oxygen and captures the resulting biogas, digestate, and effluent. There are a wide range of feedstocks that are suitable for anaerobic digestion, including food

waste, green waste, wood waste, sewage sludge (considered co-digestion), and animal manure.¹⁵⁴ For the byproducts generated by this process, biogas can be further used as a renewable energy source or liquid fuel (renewable natural gas), and the nutrient-rich digestate can be used as a fertilizer.¹⁵⁵

Applicability to the Kaua'i Waste Stream

Anaerobic digestion could target food and other organics making up approximately 28 percent of the County's waste stream,¹⁵⁶ notwithstanding the potential for co-digestion at wastewater treatment plants on the island. However, collection service route changes would need to be implemented to provide the contaminant-reduced feedstocks necessary for an anaerobic digestion facility.

Commercial Status

Anaerobic digestion technology is commercially effective at a variety of scales, including at wastewater treatment plants (considered a co-digestion process), standalone digesters for commercial and residential source-separated organic waste streams, and on-farm digesters.¹⁵⁷ There are 13 operational facilities in California alone and 16 ready to come online.¹⁵⁸ Anaerobic digestion has been used for over 30 years in Europe; in 2013, there were 244 plants with more than 8 million tons of annual capacity¹⁵⁹.

Risk Factors

Like many of the technologies discussed in this section, anaerobic digestion requires source-separated material and limited contaminants. This may translate to the implementation of collection service changes for residential and commercial customers, along with the associated education, outreach, and potential compliance mechanisms (for example, fines) that will ensure an effective feedstock. Otherwise, extensive pre-processing and mechanical/optical sortation equipment and labor will be required at RTS. As always, costs are also a potential limiting factor for new facilities,¹⁶⁰ although the multiple marketable products, the greenhouse gas emissions reductions, and avoided landfill costs of anaerobic digestion facilities may be appealing for the County.

10.4.3 Pyrolysis and Gasification

Pyrolysis and gasification differ from conventional WTE in that they do not combust the waste: instead, they convert the solid organic (carbon-based) portion of the waste stream into a synthesis gas that can be used to generate electricity or be used in petrochemical and refining industries, a biofuel which can be upgraded to engine fuel, and a solid residue (char, which can be used in the manufacture of activated carbon filtration media or as an agricultural soil amendment).¹⁶¹ Like many of the technologies discussed in this section, pre-processing to remove certain materials such as glass, metals, and inert materials is required for efficient and cost-effective operations.¹⁶²

¹⁵⁴ Global Methane Initiative. 2016. *Overview of Anaerobic Digestion for Municipal Solid Waste*. https://www.globalmethane.org/documents/AD-Training-Presentation_Oct2016.pdf; Additional information provided by PVT Land Company Limited. November 21, 2018.

¹⁵⁵ Ibid.

¹⁵⁶ Refer to Table 2-7.

¹⁵⁷ EPA. n.d. "Types of Anaerobic Digesters." Accessed May 6, 2020. <https://www.epa.gov/anaerobic-digestion/types-anaerobic-digesters>

¹⁵⁸ CalRecycle. 2020. "California Anaerobic Digestion Projects Accepting Organics from the Municipal Solid Waste Stream." Accessed May 6, 2020. <https://www2.calrecycle.ca.gov/Docs/Web/115971>

¹⁵⁹ De Baere, Luc and Bruno Mattheeuws. 2013. *Anaerobic Digestion of the Organic Fraction of Municipal Solid Waste in Europe: Status, Experience and Prospects*. Accessed May 6, 2020. <https://www.ows.be/wp-content/uploads/2013/02/Anaerobic-digestion-of-the-organic-fraction-of-MSW-in-Europe.pdf>

¹⁶⁰ Global Methane Initiative. 2016. *Overview of Anaerobic Digestion for Municipal Solid Waste*. https://www.globalmethane.org/documents/AD-Training-Presentation_Oct2016.pdf; Additional information provided by PVT Land Company Limited. November 21, 2018.

¹⁶¹ Zafar, Salman. 2019. "Pyrolysis of Municipal Wastes." BioEnergy Consult. Accessed May 6, 2020. <https://www.bioenergyconsult.com/pyrolysis-of-municipal-waste/>

¹⁶² Zafar, Salman. Op Cit.

Applicability to the Kaua'i Waste Stream

With pre-processing technologies (mechanical, manual, or other) to remove the contaminants in the pyrolysis/gasification feedstock, this method of MSW treatment could process approximately 65 percent of the County's waste.¹⁶³

Commercial Status

There are numerous small-scale MSW pyrolysis and gasification systems operating worldwide, mostly in applications where the syngas is simply combusted and the flue gas vented through a stack. The resulting ash and moisture byproduct of the system typically amounts to 15 to 20 percent by weight of the feedstock throughput.¹⁶⁴ In the U.S., these facilities typically are owned and operated by small municipalities. One example is the City of Dillingham, Alaska, which installed a 20-ton-per-day gasification plant in 2014.¹⁶⁵

Risk Factors

Technology risks may include reduced reliability because of the complexity and integration issues associated with downstream conversion systems for producing products other than electricity. Capital and operating costs are another issue that could limit implementation of this technology. Maoyun He et al. (2008) found that an inexpensive catalyst (calcined dolomite) increased hydrogen yield and improved the conversion of tar and char during the steam gasification of MSW.¹⁶⁶ However, to achieve this, the reactor was brought to 700 to 950 degrees Celsius for a sustained period;¹⁶⁷ gasification itself is highly temperature dependent. High energy inputs like these, besides the feedstock issues associated with heterogenous MSW, should be considered when assessing the feasibility of pyrolysis and gasification, especially when compared to less complex technologies like conventional mass-burn WTE.

10.4.4 MSW Aerobic Composting

Composting is a well-established technology with a proven track record at various scales for processing separated green waste, yard waste, food waste, or a combination of these waste types. Many iterations of aerobic composting technologies exist and differ mainly in how the piles are aerated (passively, or actively turned). Composting converts the organics portion of the waste stream into a compost product that can have beneficial reuse effects for soil conditioning, water retention, and erosion control. MSW composting, however, refers to composting mixed solid waste, rather than a separated stream of green waste or food waste.

Applicability to the Kaua'i Waste Stream

MSW composting would target approximately 28 percent of the County's waste stream,¹⁶⁸ as food waste and green waste are ideal feedstocks for this technology; with the addition of the paper fraction, this technology could recycle up to 47 percent of the County's waste stream. Because the County provides automated collection services for residents and some commercial customers, it can likely implement MSW composting without major route or service changes (this does not preclude necessary materials handling and pre-processing changes at RTSS).

¹⁶³ Refer to Table 2-7.

¹⁶⁴ CH2M HILL Canada Limited. 2010. *Organic Waste and Biosolids Master Plan Thermal Treatment Technology Options*. Final. December 15.

¹⁶⁵ Global Syngas Technologies Council. 2017. "City of Dillingham Waste System." <https://www.globalsyngas.org/resources/world-gasification-database/city-of-dillingham-waste-system>.

¹⁶⁶ He, Maoyun, et al. 2008. Hydrogen-rich gas from catalytic steam gasification of municipal solid waste (MSW): Influence of catalyst and temperature on yield and product composition. *International Journal of Hydrogen Energy*. Accessed May 6, 2020. <https://www.sciencedirect.com/science/article/abs/pii/S0360319908012342>.

¹⁶⁷ Ibid.

¹⁶⁸ Refer to Table 2-7.

Commercial Status

There are four permitted green waste composters in the County.¹⁶⁹ MSW composters are much rarer in the U.S. According to BioCycle's 2017 State of Organics Recycling survey, only 0.2 percent of U.S. composting facilities process mixed MSW,¹⁷⁰ and there have been a few, notable costly failures of MSW composting in North America (for example, in Dade County, Florida, and Portland, Oregon).^{171 172}

Risk Factors

Composting MSW does have some challenges. Depending on odor concerns, these facilities may need to be sited far from sensitive receptors or within a closed building. Unlike food and green waste streams used in widespread composting, the MSW waste stream is not source-separated and requires significant pre-processing prior to composting. Depackaging, dewatering, and front-end sorting technologies to pre-process the MSW feedstock and remove potentially toxic materials can be combined with this type of composting to reduce residual rates from the end product,¹⁷³ but these will affect the cost and scale of an MSW composting facility. Finally, the end product from MSW composting typically is high in heavy metals and other contaminants, making it difficult to find suitable end uses for the product other than very low value applications such as mine reclamation.

10.4.5 Mechanical-Biological Treatment

MBT of municipal solid waste refers to a range of activities and technologies to deal with the MSW stream for systems without source separation.¹⁷⁴ In general, it refers to the integration of MSW treatment processes normally found in MRF, RDF plants, and composting plants. A key feature of MBT facilities is the use of mechanical separation to remove and recover non-organic components of the MSW stream, as well as biological treatment to stabilize the organic fraction of the MSW stream.

MBT facilities involve waste input and control, mechanical preparation, biological treatment, and product conditioning. Waste input and control normally consists of manually removing oversized and hazardous materials. Mechanical processing can include minimal separation or shredding, or sophisticated sorting of the inbound waste into biodegradable material, recyclables, and contaminant streams. Sorting is usually done with dry processes but it can also involve wet processes, such as flotation and hydro-pulping. Hand-sorting systems have also been implemented at some facilities, but this increases health and safety requirements for staff. Depending on the quality and market demand, the recyclables are typically sold, but paper fibers, textiles, rubber, plastics, and residual organics can also be used as RDF. MBT systems can be classified into three main types of facilities:

- Biological treatment used to produce RDF for combustion.
- Anaerobic digestion to recover energy.
- Composting to stabilize organic wastes or to produce a soil amendment.

Applicability to the Kaua'i Waste Stream

Depending on process cost, market condition, and sophistication, this process could potentially treat 100 percent of the County's waste, with relatively little residual sent to landfill. Similar to MSW composting, there would likely be limited markets for any compost product produced from an MBT system.

¹⁶⁹ See Section 1.5.2.

¹⁷⁰ BioCycle. 2017. "The State of Organics Recycling in the U.S." <https://www.biocycle.net/2017/10/04/state-organics-recycling-u-s/>.

¹⁷¹ Halbach. Past Successes, Failures and Opportunities: Growing Better Plants. 2015. https://swroc.cfans.umn.edu/sites/swroc.cfans.umn.edu/files/composting_halbach.pdf.

¹⁷² Gamble, S, "Five Years of Composting in Edmonton" Biocycle Vol 46, No 10.

¹⁷³ New York City Department of Sanitation. 2004. *New York City MSW Composting Report*. https://www1.nyc.gov/assets/dsny/docs/about_2004-municipal-solid-waste-composting-report_0815.pdf.

¹⁷⁴ Arsova, Ljupka. 2015. "Waste Conversion Mechanical Biological Treatment (MBT) Concept for Material and Energy Recovery from Mixed MSW." <https://wasteadvantagemag.com/waste-conversion-mechanical-biological-treatment-mbt-concept-for-material-and-energy-recovery-from-mixed-msw/>. Accessed May 6, 2020.

Commercial Status

Europe has many MBT plants; the number increased 60 percent from 2005 to 2011, to approximately 330 facilities processing up to 44 million tons per year.¹⁷⁵ The most analogous facility type in the U.S. are dirty MRFs, but these rarely produce RDF. Fan Fei et al. (2018) found that MBT combined with biogas purification systems had the highest energy efficiency (38.5 percent energy recovery) against landfilling and incineration of MSW.¹⁷⁶

Risk Factors

Capital and operating costs for MBT facilities are relatively high. German MBT plants have reported operational costs of \$43 to \$103 per ton of MSW processed.¹⁷⁷ In addition, the quality of the recovered recyclables and produced compost is reported to be generally very poor.¹⁷⁸ As zero waste proponents have noted, clean, high-quality compost requires source separation of organic materials.

10.4.6 Chemical Recycling

Traditional plastics recycling uses mechanical shredders to break up resin materials with the same resin identification code, melt them, and pelletize them for reuse. This process is relatively simple, inexpensive, and widespread on a commercial scale. However, each time the material is recycled, it loses quality due to heat and mechanical stress, contamination from additives and colorants, and mixed resin types. These recycled materials also struggle to compete with the low cost of virgin plastics. Alternatively, chemical recycling involves breaking down plastics to their chemical building blocks for potentially infinite reuse applications via a variety of methods, including depolymerization, solvolysis, pyrolysis, and gasification.

Applicability to the Kaua'i Waste Stream

Eleven percent of the County's waste stream¹⁷⁹ is composed of plastics, although granularity among resin types in the waste stream are unknown. The County's voluntary recycling program at eight drop-off sites only accepts plastics #1 and #2 from residents. Commercial customers can arrange for a private hauler to collect and process plastics.

Commercial Status

Chemical recycling capacity has seen movement recently, especially as recent groundbreaking research has revealed the fate of all 6,300 million metric tons of plastic waste produced through 2015: only 9 percent was recycled, 12 percent incinerated, and the remaining 79 percent landfilled or accumulated in the natural environment.¹⁸⁰ Several companies have capitalized on plastic waste through the development of chemical recycling technologies, including Agilyx¹⁸¹ (polystyrene-to-styrene and mixed plastics-to-crude processes), and Renewology¹⁸² (converts post-consumer plastic waste to petrochemical products via pyrolysis).

¹⁷⁵ Arsova, Ljupka. 2015. "Waste Conversion Mechanical Biological Treatment (MBT) Concept for Material and Energy Recovery from Mixed MSW." <https://wasteadvantagemag.com/waste-conversion-mechanical-biological-treatment-mbt-concept-for-material-and-energy-recovery-from-mixed-msw/>. Accessed May 6, 2020.

¹⁷⁶ Fei, Fan et al. 2018. *Mechanical biological treatment of municipal solid waste: Energy efficiency, environmental impact and economic feasibility analysis*. Journal of Cleaner Production. Accessed May 6, 2020. https://www.researchgate.net/publication/322358445_Mechanical_biological_treatment_of_municipal_solid_waste_Energy_efficiency_environmental_impact_and_economic_feasibility_analysis

¹⁷⁷ Arsova, Ljupka. Op Cit.

¹⁷⁸ Ibid.

¹⁷⁹ Refer to Table 2-7.

¹⁸⁰ Geyer et al. 2017. *Production, use, and fate of all plastics ever made*. Accessed May 5, 2020. <https://advances.sciencemag.org/content/3/7/e1700782>.

¹⁸¹ Agilyx. Accessed May 5, 2020. <https://www.agilyx.com/>.

¹⁸² Renewology. Accessed May 5, 2020. <http://renewology.com/>

Risk Factors

Historically, the low cost of oil has been a hindrance to all types of plastic waste recycling. In addition, Haig et al. (2013) found that for pyrolysis and catalytic depolymerization technologies, the minimum economically viable throughput would be between 12,000 to 16,000 tons per year.¹⁸³ These barriers may make it difficult to undertake chemical recycling for the County's plastic waste portion of the waste stream, as the most recent data shows this portion would not be economically viable.

10.5 Waste Export

Exporting waste off-island is another possible long-term disposal option that has been explored by other counties in Hawai'i and is technically feasible.

10.5.1 Waste Export to H-POWER or Hawai'i County Landfill

H-POWER is a WTE facility located on O'ahu, and the West Hawai'i Sanitary Landfill is located in Hawai'i. Both H-POWER and the West Hawai'i Sanitary Landfill have capacity by volume to accept waste from off-island sources, providing a possible technically feasible option for disposing of MSW from Kaua'i.

Per the 2019 City and County of Honolulu ISWMP, H-POWER has an operational maximum capacity of 900,000 tons per year and projects a tonnage receipt of 793,000 tons in 2028. Based on this, H-POWER has the capacity to accept more waste for at least the next 10 years without expansion.¹⁸⁴ The West Hawai'i Sanitary Landfill is anticipated to have 50 to 100 years of capacity remaining at the current acceptance rate.¹⁸⁵

Despite the apparent availability of capacity at these facilities, exporting waste off-island would be complex logistically and would likely face strong opposition. Modifications to permits or other official variance or agreements will likely be needed before waste export can occur to either facility. For example, Honolulu's County's charter does not allow off-island waste to be sent to H-POWER, and the permit for H-POWER does not allow the disposal of waste from other islands. There are significant barriers that would need to be overcome to make this option a reality. It should also be noted that waste export to H-POWER would still require landfilling for the disposal of ash and bypass MSW and currently there is very little available landfill capacity on O'ahu.

The estimated cost for waste export to H-POWER or the West Hawai'i Sanitary Landfill is highly uncertain but is estimated to range from \$200 to \$400 per ton. This estimate includes transferring waste into intermodal containers, transporting waste to Nawiliwili Harbor, loading and unloading containers there, shipping waste to the off-island port, paying the H-POWER tip fee, paying for ash disposal, transporting waste to the receiving facility, and unloading containers there for disposal and the return trip to Kaua'i.¹⁸⁶

Table 10-4 presents advantages and disadvantages for considering a waste export to either or both of H-POWER and the West Hawai'i Sanitary Landfill as a long-term disposal option.

¹⁸³ Haig et al. 2013. *Plastics to oil products*. Zero Waste Scotland.

<https://www.zerowastescotland.org.uk/sites/default/files/Plastics%20to%20Oil%20Report.pdf>

¹⁸⁴ City and County of Honolulu. 2019. 2019 Integrated Solid Waste Management Plan Update.

https://www.opala.org/solid_waste/pdfs/ISWMP_2019_Final.pdf.

¹⁸⁵ Hawai'i Public Radio. 2020. Hawai'i Island Has Decades of Landfill Space But Still Faces Challenges In Dealing With Its Waste.

<https://www.hawaiipublicradio.org/post/hawaii-island-has-decades-landfill-space-still-faces-challenges-dealing-its-waste#stream/0>.

¹⁸⁶ Young Brothers. 2020. Container Rates. <http://htbyb.com/wp-content/uploads/2020.02.07-Container-PFFRGvan.pdf>.

¹⁸⁷ EPA. 2016. Volume-to-Weight Conversion Factors. https://www.epa.gov/sites/production/files/2016-04/documents/volume_to_weight_conversion_factors_memo_04192016_508fnl.pdf.

¹⁸⁸ City and County of Honolulu. 2004. Refuse Collection and Disposal Rate Schedule. https://www.opala.org/pdfs/solid_waste/rates04.pdf.

¹⁸⁹ County of Hawai'i. 2020. County of Hawai'i Solid Waste Facilities. <https://www.hawaiizerowaste.org/facilities-2/>.

¹⁹⁰ Jacobs estimates based on prior waste export studies, waste export price proposals, and trucking cost model.

Table 10-4. Advantages and Disadvantages for Waste Export to H-POWER and/or West Hawai'i Sanitary Landfill

Advantages	Disadvantages
H-POWER and West Hawai'i Sanitary Landfill provide local options for waste disposal (as opposed to waste export out of the state).	Permitting and approval challenges and public opposition in receiving counties could make this option infeasible.
H-POWER and West Hawai'i Sanitary Landfill appear to have enough capacity to support waste export.	Export has complex logistics and high, uncertain costs.
	The County will rely on agreements with and capacity of solid waste facilities that they do not control.
	Export to another facility may require RTS infrastructure investment (for example, for compaction) and permits and agreements to comply with waste disposal requirements at these facilities.

10.5.2 Waste Export to Mega Landfills on West Coast of Mainland U.S.

Outside of the local waste export options inter-island, the next most feasible waste export destinations are located on the mainland's west coast. There are a few large landfills on the west coast with projected closure dates outside of the long-term planning horizon of 30 years. These include the following:¹⁹¹

- Frank R. Bowerman Landfill (Irvine, California), accepting 2.5 million tons per year with a projected closure date of 2053.
- Columbia Ridge Landfill (Arlington, Oregon), accepting 2.3 million tons per year with a projected closure date of 2135.
- Roosevelt Regional Landfill (Roosevelt, Washington), accepting 1.9 million tons per year with a projected closure date of 2075.
- Apex Regional Landfill (Las Vegas, Nevada), accepting 2.5 million tons per year with a projected closure date of 2220.

The disadvantages for this option are further exacerbated by the distance of the mainland landfills from Kaua'i. In addition, several of these landfills already receive waste from outside of their immediate region, which could ease an agreement for waste export but could also potentially pose issues with multiple jurisdictions vying for landfill airspace.

In 2010, a company called Hawai'i Waste Systems had an agreement to transport waste in shrink-wrapped bales from O'ahu to the Roosevelt Regional Landfill in eastern Washington state. Days before shipments were to commence, a U.S. District Court judge granted a temporary restraining order on behalf of the Yakama Nation and environmental groups who challenged the shipments based on an inadequate review of the environmental impacts of the shipments particularly as they pertained to potential threats from invasive species. That ruling would presumably be a strong hindrance to any subsequent plans to ship waste from Kaua'i County to the mainland U.S.¹⁹²

The estimated cost for waste export to west coast mainland solid waste facilities is estimated to range from \$180 to \$310 per ton. This estimate includes transferring waste into intermodal containers, transporting waste to Nawiliwili Harbor, loading and unloading containers there, shipping waste to the mainland port (with or without a stop in Honolulu depending on the shipping contract arrangement),

¹⁹¹ Waste Today. 2020. The 30 largest landfills in the U.S. list. <https://www.wastetodaymagazine.com/article/largest-landfills-list-us/>.

¹⁹² https://www.oregonlive.com/environment/2010/07/judge_delays_hawaii_garbage_sh.html

transporting waste to the receiving facility, and unloading containers there for disposal and the return trip to Kaua'i.^{193 194}

Table 10-5 presents advantages and disadvantages for considering a waste export to west coast mainland landfills as a long-term disposal option.

Table 10-5. Advantages and Disadvantages for Waste Export to West Coast Mainland Landfills

Advantages	Disadvantages
West coast mainland landfills appear to have enough capacity to support waste export.	The County will rely on agreements and capacity of solid waste facilities that they do not control.
Some landfills are already accepting waste exports, which could facilitate agreements and/or processing logistics.	A 2010 U.S. District Court ruling may preclude shipping waste from Hawai'i to the mainland U.S.
	Export to another facility may require added RTS infrastructure investment (for example, for compaction, baling, or shrink-wrapping) and permits and agreements to comply with waste export to these facilities.
	Export has complex logistics and high, uncertain costs.

10.6 Cost Summary and Long-Term Disposal Strategy

10.6.1 Cost Summary

The estimated costs of the disposal options (not including the alternative technologies in Section 10.4) are shown in Table 10-6 and on Figure 10-1.

Table 10-6. Estimated Cost of Long-Term Disposal Options

Long-Term Disposal Option	Estimated 2020 \$/ton		Annual Cost (\$million, 2020) for 94,000 tons per year	
	Low	High	Low	High
<i>Kaua'i Landfill</i>				
Current Cost at Kekaha Landfill	\$95		\$9.0	
Mine Kekaha Phase 1 and Expand	unknown			
New Ma'alo Road Landfill	\$85	\$130	\$8.0	\$12.2
New Landfill other than Ma'alo Road	\$95	\$140	\$8.9	\$13.2
Waste-to-Energy	\$190	\$280	\$17.9	\$26.3
<i>Waste Export</i>				
to H-POWER or Hawai'i County landfill	\$200	\$400	\$18.8	\$37.6
to west coast of Mainland U.S.	\$180	\$310	\$16.9	\$29.1

¹⁹³ World Freight Rates. 2020. Freight Calculator. <https://www.worldfreightrates.com/en/freight>.

¹⁹⁴ Jacobs estimates based on prior waste export studies, waste export price proposals, and trucking cost model.

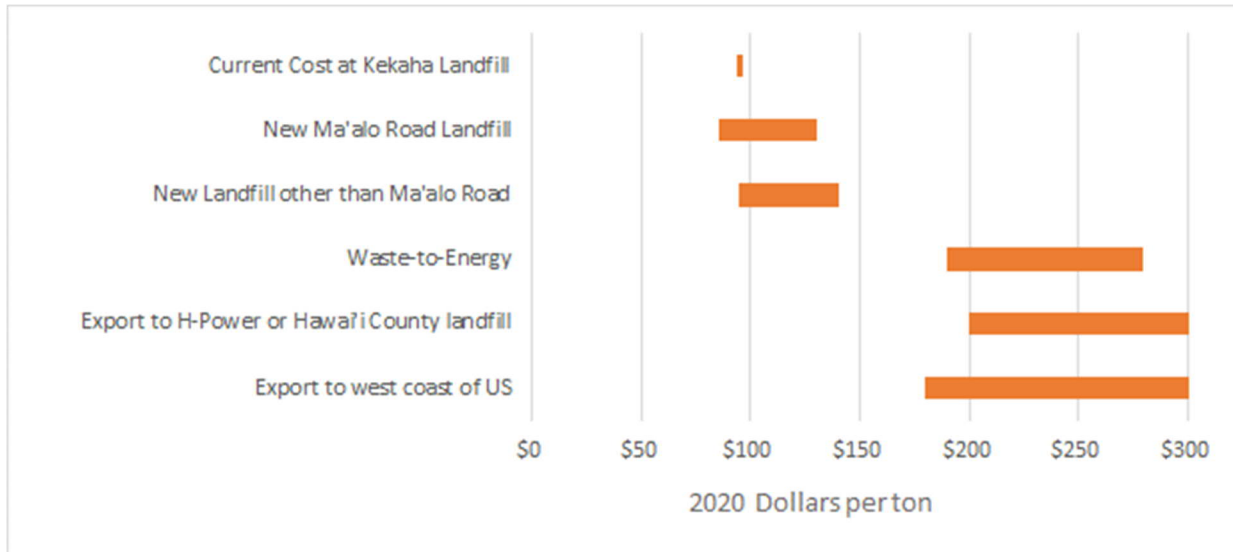


Figure 10-1. Cost Comparison of Long-Term Disposal Options

10.6.2 Long-Term Disposal Strategy

As of January 2021, the Kekaha Landfill is estimated to have a little less than 10 years of remaining capacity assuming a vertical expansion is completed. That remaining life can be extended by implementing the waste reduction and diversion programs recommended in this ISWMP. In addition, the County has recently purchased a new landfill compactor and GIS infrastructure that should help extend the life of the current permitted capacity.

For the longer term, the County will continue efforts to further reduce the amount of waste requiring disposal and will identify, select, and initiate an alternative disposal option, which will likely include development of a new landfill on the island of Kaua'i.

11. Energy Balance

11.1 Purpose

Energy is a valuable and critical resource within the State of Hawai'i. Because Hawai'i is isolated from the U.S. mainland, its energy infrastructure and consumption are unique among the states. Hawai'i depends heavily on imported fossil fuels to meet energy demand. More than 75 percent of Hawai'i's energy comes from petroleum, with the remaining energy consumption a combination of natural gas, coal, and renewable energy.¹⁹⁵

Therefore, this Plan section evaluates the impact of key components of the Kaua'i proposed solid waste management system on reducing dependency on fossil fuels.

11.2 Background

HRS Section 342G-26 (d) requires that the energy component of the Plan describe the programs by which the County will investigate or incorporate ways of increasing the energy efficiency of the solid waste management process, including the assessment of energy and fuel-production options such as composting, anaerobic digestion, acid hydrolysis, or a combination thereof. The energy component shall identify and assess:

- The amount of energy input, including, but not limited to, electrical power, gasoline, diesel fuel, coal, natural gas, propane, kerosene, and heating oil required by the Plan for the accomplishment of collection, recycling, composting, bioconversion, waste handling, disposal and landfill.
- The amount of energy produced from waste, including electricity, natural gas, hydrogen and liquid fuels such as ethanol or methanol.
- The net energy use or energy production to the solid waste program. Where feasible, this assessment shall include energy used in the original manufacture of these goods. National averages of energy consumed may be incorporated in these estimates.
- Methods by which energy use may be decreased or net energy or fuels production may be increased.

The statewide Aloha+ Challenge includes the following goals:

- Increase renewable energy in the electricity sector to 40 percent and 30 percent energy efficiency by 2030. Work toward 100 percent clean energy by 2045.
- By 2030, reduce total annual fossil fuel use to below the 2008 level.

These goals are aligned with House Bill (HB) 623, which sets a 100 percent Renewable Portfolio Standards for the electricity sector by 2045.

11.3 Energy Balance Estimates

The EPA Waste Reduction Model (WARM) was used to evaluate the energy impact of the current waste system and one alternative scenario. The WARM model calculates and totals energy generation and usage of baseline and alternative waste management practices for source reduction, recycling, combustion, composting, anaerobic digestion, and landfilling.¹⁹⁶

WARM is a tool designed and supported by EPA to help solid waste planners and organizations track energy balances and greenhouse gas emissions associated with different waste management

¹⁹⁵ U.S. Energy Information Administration. 2019. Hawai'i State Profile and Energy Estimates. December. <https://www.eia.gov/state/?sid=HI#tabs-1>.

¹⁹⁶ EPA. 2019. Waste Reduction Model (WARM). <https://www.epa.gov/warm>.

practices.¹⁹⁷ The WARM model performs a lifecycle analysis for a given waste system and accounts for many of the processes required to support that waste system, including the following:

- 1) Transportation to move recyclables (including organics) to facilities for reprocessing so they can be converted to feedstocks and reused.
- 2) The energy involved in reprocessing recyclables.
- 3) The energy savings resulting from the use of recycled feedstocks, rather than virgin materials.
- 4) Transportation to move solid waste-to-energy recovery facilities and landfills.
- 5) Energy used to operate energy recovery facilities and landfills.
- 6) Electricity production offset by the generation of electricity at energy recovery facilities.

Energy use estimates are presented in MMBtu.

The WARM model was not used for recyclables sent overseas to recycling markets, because it does not allow for marine transport of materials. Instead, transportation energy for recyclables was estimated outside the model using approximate marine distances between Nawiliwili Harbor and Taiwan, Indonesia, and California (2,700 to 7,000 miles) for overseas transport, the actual distance from the recycling facility to Nawiliwili Harbor, and an estimated default distance of 20 miles from the overseas port to the end use destination.¹⁹⁸

Two scenarios were analyzed to understand the energy inputs required to operate the solid waste system and net energy use of the system:

- 1) Scenario 1: Existing System, FY 2019. This scenario represents the current waste system, using FY 2019 data.
- 2) Scenario 2: Increased Diversion through Regulation, Infrastructure, and Programs. This scenario represents a hypothetical case using FY 2019 data and diversion assumptions associated with implementation of disposal restrictions, an MRF, and diversion programs.

11.3.1 Scenario 1: Existing System, FY 2019

Scenario 1 presents the energy use for the existing solid waste system, using FY 2019 quantities. Details on the existing solid waste system are provided in Section 1. In general, the main disposal and diversion methods are through the landfill, recycling facilities, and compost facilities.

Table 11-1 shows the inputs for the energy analysis, drawing from waste composition data provided in Section 2. In cases where the waste composition category was not available in WARM, the category was converted to an equivalent WARM model category.

As noted above, the WARM model does not allow for energy estimates for transportation of materials overseas, such as shipping recyclables to other countries for processing. Much of Kaua'i's recyclables are transported to end use destinations off-island; therefore, energy use to transport recyclables overseas was calculated separately from WARM, using energy factors from the Business for Social Responsibility¹⁹⁹ and the Texas Transportation Institute.²⁰⁰ Common overseas shipping destinations in FY 2019 included Taiwan, Indonesia, and California and it was assumed that these destinations would remain the same for modeled scenarios.²⁰¹

¹⁹⁷ Ibid.

¹⁹⁸ This analysis assumes that there will be empty containers available to be shipped from Nawiliwili Harbor to the overseas destination and the energy estimates account for the shipping of the full containers one way only.

¹⁹⁹ BSR. 2015. *How to Calculate and Manage CO₂ Emissions from Ocean Transport*. February.

²⁰⁰ Texas Transportation Institute (TTI). 2012. *A Model Comparison of Domestic Freight Transportation Effects on the General Public: 2001-2009*. Center for Ports and Waterways. February.

²⁰¹ This analysis assumes that there will be empty containers available to be shipped from Kaua'i to overseas shipping destinations and the energy estimates account for the shipping of the full containers one way only.

The WARM model estimates a baseline total energy use for Scenario 1 of -535,681 MMBtu. The energy cost to transport recyclables overseas is 21,481 MMBtu. In total, the energy balance for Scenario 1 is -514,200 MMBtu. This represents the energy savings that results from recycling and composting that occurs on Kaua'i compared to landfilling those materials.

Table 11-1. WARM Model Scenario 1 Tons, FY 2019

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MMBtu
Corrugated Containers	5,041	3,985	0	n/a	n/a	(75,288)
Newspaper	0	725	0	n/a	n/a	194
Office Paper	0	1,177	0	n/a	n/a	316
Mixed Paper (general)	825	10,869	0	n/a	n/a	(14,075)
Food Waste	n/a	9,380	0	2,265	0	3,839
Yard Trimmings	n/a	5,615	0	27,453	0	17,539
Branches	n/a	91	0	0	0	24
HDPE	0	554	0	n/a	n/a	149
PET	0	646	0	n/a	n/a	173
PS	n/a	646	0	n/a	n/a	173
Mixed Plastics	1,677	8,627	0	n/a	n/a	(63,479)
Portable Electronic Devices	119	84	0	n/a	n/a	(2,495)
Mixed Electronics	197	1,548	0	n/a	n/a	(1,934)
Aluminum Cans	264	364	0	n/a	n/a	(40,269)
Steel Cans	–	455	0	n/a	n/a	122
Mixed Metals	5,186	2,732	0	n/a	n/a	(344,606)
Glass	1,322 ^a	2,550	0	n/a	n/a	(2,182)
Asphalt Concrete	19,451	3	n/a	n/a	n/a	(24,507)
Asphalt Shingles	0	1,723	0	n/a	n/a	462
Carpet	0	543	0	n/a	n/a	146
Concrete	0	1,179	n/a	n/a	n/a	316
Dimensional Lumber	598	12,784	0	n/a	n/a	3,756
Drywall	0	3,083	n/a	n/a	n/a	827
Fly Ash	0	182	n/a	n/a	n/a	49
Tires	516	0	0	n/a	n/a	(1,883)
Mixed Recyclables	13	0	0	n/a	n/a	(193)
Mixed Organics	n/a	10,143	0	2,346	0	4,091
Mixed MSW	n/a	11,378	0	n/a	n/a	3,052

Table 11-1. WARM Model Scenario 1 Tons, FY 2019

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MMBtu
WARM Subtotal ^b	35,209	91,066	0	32,064	0	(535,681)
Overseas Transport	n/a	n/a	n/a	n/a	n/a	21,481
Total	35,209	91,066	0	32,064	0	(514,200)

^a For the purpose of the energy balance analysis, the Recycled Glass value excludes non-HI5 glass because this is used on-island for construction, landscaping, and other projects. Diverted non-HI5 glass is not shipped overseas.

^b There may be apparent summation differences due to rounding.

11.3.2 Scenario 2: Increased Diversion through Regulation, Infrastructure, and Programs, FY 2019

For a comparison with Scenario 1, Scenario 2 was designed to portray a hypothetical scenario that assumes the County has an MRF and the following programs were in effect in FY 2019:

- Curbside Recycling and MRF.
- Comprehensive Food Waste Program.
- Pallets Program.
- Commercial Disposal Restrictions.

The residential curbside recycling program was assumed to include collection of cardboard, mixed paper, glass, aluminum cans, tin cans, bi-metal, plastic containers, green waste, and food waste. The collected material would either be processed at an MRF capable of processing 15,000 tons per year or an industrial composting facility. The MRF would process both residential and commercial material and assumptions for material processing and diversion in Scenario 2 are based on *A Conceptual Design for Single Stream Materials Recycling Facility (Clean MRF) at the Existing Kaua'i Resource Center* prepared by CalRecovery, Inc.²⁰² These initiatives in Scenario 2 are consistent with enhancement opportunities detailed in Section 4.

The Comprehensive Food Waste Program would be a formalization of current practices using food waste as animal feed as well as incorporate the diversion of food through a residential curbside collection program and commercial disposal restrictions. Formalization of practices to send food waste for use as animal feed is assumed to result in a nominal change to diversion. Food waste diversion through curbside collection and commercial disposal restrictions is included with other assumed Scenario 2 programs.

The Pallets Program is the assumed result of the enhancement opportunity for pallet processing detailed in Section 4. The Pallets Program would facilitate collection and recycling of pallets, with the assumption that 80 percent of on-island pallets would be diverted.

County Ordinance 902 bans the landfill disposal of commercially generated loads exceeding 10 percent corrugated cardboard, 10 percent ferrous and non-ferrous metal, or 10 percent green waste by volume.²⁰³ Scenario 2 assumes additional commercial disposal restrictions for mixed paper, food waste, and C&D material, with diversion rates of 75 percent, 50 percent, and 75 percent, respectively. These assumed commercial disposal restrictions reflect the enhancement opportunity detailed in Section 4.

Table 11-2 shows the inputs for the energy analysis of a hypothetical Scenario 2. The WARM model estimates a baseline total energy use for Scenario 2 of -744,356 MMBtu. The energy cost to transport recyclables overseas is 38,551 MMBtu. In total, the energy balance for Scenario 2 is -705,805 MMBtu.

²⁰² CalRecovery, Inc. 2016. *A Conceptual Design for Single Stream Materials Recycling Facility (Clean MRF) at the Existing Kaua'i Resource Center*. December.

²⁰³ County of Kaua'i. 2020. *Ordinance 902*. <https://www.kauai.gov/LandfillBans>. Accessed May 14, 2020.

This represents the energy savings that results from recycling and composting that occurs on Kaua'i compared to landfilling those materials, as a result of increased diversion through regulation, infrastructure, and programs.

Table 11-2. WARM Model Scenario 2 Tons, Increased Diversion

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MMBtu
Corrugated Containers	5,291	3,736	0	n/a	n/a	(79,134)
Newspaper	0	725	0	n/a	n/a	194
Office Paper	0	1,177	0	n/a	n/a	316
Mixed Paper (general)	9,303	2,391	0	n/a	n/a	(191,053)
Food Waste	n/a	6,347	0	5,299	0	4,797
Yard Trimmings	n/a	5,615	0	27,453	0	17,539
Branches	n/a	91	0	0	0	24
HDPE	0	554	0	n/a	n/a	149
PET	0	646	0	n/a	n/a	173
PS	n/a	646	0	n/a	n/a	173
Mixed Plastics	1,677	8,627	0	n/a	n/a	(63,479)
Portable Electronic Devices	119	84	0	n/a	n/a	(2,495)
Mixed Electronics	197	1,548	0	n/a	n/a	(1,934)
Aluminum Cans	278	351	0	n/a	n/a	(42,373)
Steel Cans	309	147	0	n/a	n/a	(6,139)
Mixed Metals	5,186	2,732	0	n/a	n/a	(344,606)
Glass	3,794 ^a	78	0	n/a	n/a	(8,205)
Asphalt Concrete	19,451	3	n/a	n/a	n/a	(24,507)
Asphalt Shingles	1,163	560	0	n/a	n/a	(2,706)
Carpet	367	177	0	n/a	n/a	(7,841)
Concrete	796	383	n/a	n/a	n/a	(16)
Dimensional Lumber	11,843	1,540	0	n/a	n/a	6,872
Drywall	2,081	1,002	n/a	n/a	n/a	(5,222)
Fly Ash	0	182	n/a	n/a	n/a	49
Tires	516	0	0	n/a	n/a	(1,883)
Mixed Recyclables	13	0	0	n/a	n/a	(193)
Mixed Organics	n/a	10,143	0	2,346	0	4,091
Mixed MSW	n/a	11,378	0	n/a	n/a	3,052

Table 11-2. WARM Model Scenario 2 Tons, Increased Diversion

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MMBtu
WARM Subtotal ^b	62,382	60,860	0	35,097	0	(744,356)
Overseas Transport	n/a	n/a	n/a	n/a	n/a	38,551
Total	62,382	60,860	0	35,097	0	(705,805)

^a For the purpose of the energy balance analysis, the Recycled Glass value excludes non-HI5 glass because this is used on-island for construction, landscaping, and other projects. Diverted non-HI5 glass is not shipped overseas.

^b There may be apparent summation differences due to rounding.

11.4 Summary and Conclusions

Table 11-3 provides a summary of total energy use and ranking of the two energy balance scenarios. The total energy use in the table is the net energy of the system in each waste management scenario, including actions that use, produce, and save energy. It demonstrates that there is less net energy use for materials recycled/composted than there is for materials sent directly to landfill, and emphasizes the benefit of increased recycling and composting on-island.

Table 11-3. Summary of Total Energy Use and Ranking for Energy Balance Scenarios, FY 2019

Scenario	Scenario Description	Total Energy Use (MMBtu)	Net Energy Addition (Reduction)
1	Existing System, FY 2019	(514,200)	--
2	Increased Diversion through Regulation, Infrastructure, and Programs, FY 2019	(705,805)	(191,605)

12. ISWMP Cost Analysis

12.1 Purpose

The purpose of this section is to present the key assumptions, methodology and results of a cost analysis for this ISWMP. The analysis estimates the costs of operating and maintaining the solid waste system under conditions detailed in the Plan.

12.2 Background

The ISWMP cost analysis is based on a financial model developed by Jacobs for the period FY 2020-FY 2030. The first two years of operating expenses are based on the Kaua'i County Solid Waste Division's (Division) operating budget for FY 2020 and FY 2021. Actual revenue results are provided for FY 2018 and FY 2019 and estimated for FY 2020. Projections for revenues and expenses for FY 2021-FY 2030 are based on the key assumptions discussed later in this section.

Approximately 60 percent of the Division's operating and maintenance expenses are paid for by assistance from the County (General Fund). Solid waste tipping fees and other revenues pay for the remaining 40 percent of operating and maintenance expenses. Capital expenses are both debt-financed and paid for through the General Fund. One of the objectives of the ISWMP is to provide an estimate of the true cost of providing services without any incoming revenue from the General Fund. The financial model was used to estimate the cost of service for long-run implementation of the ISWMP.

Though solid waste operating and maintenance expenses are currently subsidized through the General Fund, the County has the authority and systems in place to increase commercial tipping fees and residential PAYT program fees to fully fund its solid waste programs in the future if desired.

12.3 Key Assumptions and Methodology

12.3.1 Key Assumptions

- The study period is defined as FY 2021 through FY 2030.
- General inflation is assumed to be 3 percent per year over the entire time period.
- Growth in customers and tonnage is based on forecasts of de facto population presented in Section 2 (Table 2-1). Residential and commercial customers are expected to grow by 1.1 percent per year.
- Total MSW is forecast to grow at an average annual growth rate of approximately 1.4 percent.
- 43 percent of the tonnage collected at the landfill is attributed to commercial customers, 39 percent is from County refuse trucks, and the remaining 18 percent is from self-haul customers at County RTSS.
- Capital cost projections reflect the Division's current capital projections plus any additions from Plan sections discussed above.
- Spending associated with new initiatives recommended in the Plan sections above may occur later in time than what is shown in this section. Refer to the implementation plan in Section 13 for the best predicted timing of spending on new initiatives.

12.3.2 Methodology

The methodology used to develop the financial plan and user fee recommendations consisted of the following steps:

- Mayor's Requested Budget FY 2021 operating expense data was used as the basis for projecting future operating expenses.
- Historical revenue information was provided for FY 2018 and FY 2019.

- County staff was consulted to understand historical changes in the various accounts to more accurately project account levels in the future.
- Budget data for FYs 2020 and 2021 were similarly analyzed to understand the reasons for significant fluctuations in costs and revenues, if any.
- Working with County staff, future impacts to cost accounts based on their expectations for future system performance were considered. This assumes a status quo or baseline operating level.
- Projections for future revenues and operating costs for the period FY 2021-FY 2030 were developed.
- A financial operating statement showing historical and projected revenues, operating expenses for overall Division financial performance was developed.
- A cost-of-service analysis was completed for the forecast period to determine unit costs for the various key solid waste system operating functions.

12.4 Projections of Customer Account and Solid Waste Managed

12.4.1 Solid Waste Collection Accounts

Residential and commercial solid waste collection accounts were projected using the same growth assumptions described in Section 2. The projections assume that de facto population growth will be approximately 1.4 percent per through the year 2030. These growth assumptions were applied to current household and commercial accounts to project accounts throughout the study period. Table 12-1 provides historical and projected accounts from FY 2019 through FY 2030.

Table 12-1. Historical and Projected Division Accounts

Accounts	Actual	Budget		Projected								
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	22,447	22,671	22,898	23,127	23,358	23,592	23,828	24,066	24,307	24,550	24,795	25,043
Commercial	269	272	274	277	280	283	286	288	291	294	297	300
Total	22,716	22,943	23,173	23,404	23,638	23,875	24,113	24,355	24,598	24,844	25,093	25,344

12.4.2 Solid Waste Quantities

Kaua'i County generation, recycling, and disposal, projected in Section 2, was used in the financial model to calculate the denominator for tipping fee estimates. Actual totals for FY 2019 and projections from FY 2020 through FY 2030 are shown in Table 12-2.

**Table 12-2. Historical and Projected Waste Quantities
Fiscal Years 2019-2030**

Year	Total MSW Generated (tons) ^a	Recycled Material (tons) ^b	Total MSW Disposed (tons)
2019 Actual	158,659	67,593	91,066
2020	161,265	68,703	92,562
2021	163,335	69,586	93,750
2022	165,436	70,480	94,955
2023	167,566	71,388	96,178
2024	169,728	72,309	97,419
2025	171,921	73,243	98,678
2026	174,146	74,191	99,955
2027	176,403	75,153	101,250
2028	178,693	76,128	102,564
2029	181,016	77,118	103,898
2030	184,642	78,663	105,979

^a Based on a generation rate of 8.51 pounds per capita per day, 365 days per year, and the de facto population estimate provided in Table 2-1.

^b Based on the FY 2019 baseline diversion rate of 42% (tons recycled [67,503]/tons generated [159,307]).

12.5 Operating Revenues

12.5.1 Existing Rates

Kaua'i County's RRCA is a PAYT program that went into effect in July 2015. Residents pay a variable rate for refuse collection that increases with can size and assessed on the property tax bill.²⁰⁴ A variable rate service structure provides an economic incentive for reducing trash and increasing waste diversion and recycling. Per County Ordinance 21-9.1(b), County refuse collection fees are shown in Table 12-3.

²⁰⁴ County of Kaua'i. 2020. Residential Refuse Collection Assessment. <https://www.kauai.gov/RRCA>.

Table 12-3. Residential Refuse Collection Assessment

Size or Number of Carts	Monthly Fee for Weekly Collection
Base Monthly Assessment per Benefited Property ^{a, b}	\$6.00
Curbside Refuse Collection: one 64-gallon cart	\$4.00
Curbside Refuse Collection: one 96-gallon cart	\$12.00
Assessment for each additional 64-gallon cart	\$10.00
Assessment for each additional 96-gallon cart	\$18.00

^a The Base Assessment covers the use of the RTSs and is charged regardless of whether the dwelling unit is occupied or the resident opts out of collection.

^b Per County Ordinance 21-1.3, “Benefited property” means real property on which there is a dwelling unit or units. Multiple units on a single piece of property are each considered to be a separate benefited property.

In FY 2019, the County collected refuse from approximately 269 commercial and transient vacation rental refuse collection customers.²⁰⁵ Commercial refuse is collected in the same manner as residential collection – with side-loader refuse collection trucks, each staffed by one driver. Commercial accounts are charged a collection fee based on the number containers collected weekly, as shown in Table 12-4.

Table 12-4. Commercial and Transient Vacation Rental Refuse Collection Assessment

Size or Number of Carts	Monthly Fee for Weekly Collection
Automated Collection: one 64-gallon cart	\$64.00
Automated Collection: one 96-gallon cart	\$84.00
Manual Collection: Two (2) 32-gallon receptacles	\$64.00
Manual Collection: Three (3) 32-gallon receptacles	\$84.00
Automated Collection: Each additional 64-gallon cart	\$64.00
Automated Collection: Each additional 96-gallon cart	\$84.00

Commercial businesses and other non-residential entities are required to pay to dispose of MSW and green waste at the County’s RTSs. Because the RTSs do not have scales, non-residential customers pay to use the facilities by purchasing tipping fee coupons that are available for purchase at the Treasury Department desk located in the Department of Motor Vehicles building at the Civic Center. Non-residential status is determined by license plate – vehicles with commercial plates must use coupons to access the RTSs. Commercial vans, trailers and ¾ ton capacity trucks are limited to two loads per vehicle per day.²⁰⁶ The coupon fees are as shown in Table 12-5.

²⁰⁵ Information provided by County of Kaua'i staff. March 21, 2020.

²⁰⁶ County of Kaua'i. 2020. Refuse Transfer Stations. <https://www.kauai.gov/TransferStations>.

Table 12-5. RTS Non-residential Coupon Fees

Type of Vehicle	Coupon Fee
Automobile	\$6.00
Pickup Truck – ½ ton and under	\$10.00
Full-size pickup truck – up to ¾ ton	\$20.00
Passenger Van	\$10.00
Cargo Van – up to ¾ ton	\$20.00
Small Trailer – ½ ton and under	\$10.00
Trailer – up to ¾ ton	\$20.00

The current tipping fees paid by the private haulers and other commercial vehicles at the landfill are shown in Table 12-6 (County Ordinance 21-9.2).

Table 12-6. Commercial Tipping Fees

Type of Waste	Dollars per Ton
MSW (except special wastes)	\$119.00
Asbestos-containing materials	\$218.00
Dead animals	\$119.00

12.5.2 Revenues from Rates and Fees

Annual revenues from rates and fees consist of a collection fee paid by the residential and commercial customers, coupons which are by purchased by commercial customers at the Treasury Division and collected at the RTSs, and disposal fees assessed at the landfill. Figure 12-1 presents operating revenue by source for estimated FY 2020. Total operating revenues are estimated at \$9.4 million. Tipping fee revenue at the landfill represents approximately 59 percent of total operating revenues while residential collection accounts for 38 percent. The remaining 3 percent of revenue is collected from commercial self-haul customers who purchase coupons to dispose of waste at RTSs.

The revenues from rates and fees are supplemented by revenue from the County's General Fund. The relationship between revenues from rates and fees and the General Fund are discussed below.

Table 12-7 provides historical and projected operating revenues from FY 2019 – FY 2030 at existing rates. Revenues from existing rates and fees are projected to increase from \$9.4 million in FY 2019 to nearly \$10.1 million in FY 2030, with the increase resulting in projected increases in customers and disposal quantities.

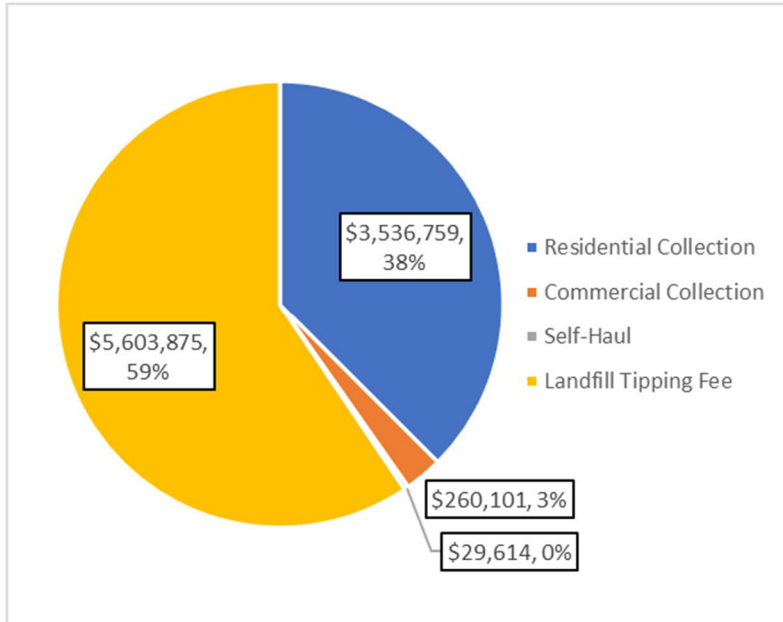


Figure 12-1. Operating Revenue from Rates and Fees by Source for Mayor's Requested Budget FY 2021

Table 12-7. Projected Operating Revenues from Existing Rates and Fees

	Actual	Budget		Projected								
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential Refuse Collection												
Base Fee	\$1,535,375	\$1,550,729	\$1,536,811	\$1,552,179	\$1,567,701	\$1,583,378	\$1,599,212	\$1,615,204	\$1,631,356	\$1,647,670	\$1,664,146	\$1,680,788
64 gallon	\$393,847	\$397,786	\$396,173	\$400,135	\$404,136	\$408,177	\$412,259	\$416,382	\$420,545	\$424,751	\$428,998	\$433,288
96 gallon	\$1,506,305	\$1,521,368	\$1,507,399	\$1,522,473	\$1,537,698	\$1,553,075	\$1,568,606	\$1,584,292	\$1,600,135	\$1,616,136	\$1,632,297	\$1,648,620
Additional 64 gallon	\$17,670	\$17,847	\$20,862	\$21,071	\$21,281	\$21,494	\$21,709	\$21,926	\$22,145	\$22,367	\$22,591	\$22,816
Additional 96 gallon	\$69,563	\$70,258	\$75,514	\$76,269	\$77,031	\$77,802	\$78,580	\$79,366	\$80,159	\$80,961	\$81,770	\$82,588
Subtotal	\$3,522,760	\$3,557,987	\$3,536,759	\$3,572,126	\$3,607,848	\$3,643,926	\$3,680,365	\$3,717,169	\$3,754,341	\$3,791,884	\$3,829,803	\$3,868,101
Commercial												
64 gallon	\$58,368	\$58,952	\$107,520	\$108,595	\$109,681	\$110,778	\$111,886	\$113,005	\$114,135	\$115,276	\$116,429	\$117,593
96 gallon	\$196,608	\$198,574	\$275,712	\$278,469	\$281,254	\$284,066	\$286,907	\$289,776	\$292,674	\$295,601	\$298,557	\$301,542
Subtotal	\$254,976	\$257,526	\$383,232	\$387,064	\$390,935	\$394,844	\$398,793	\$402,781	\$406,808	\$410,877	\$414,985	\$419,135
Coupons												
6 dollar	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10 dollar	\$20,670	\$20,877	\$21,085	\$21,296	\$21,509	\$21,724	\$21,942	\$22,161	\$22,383	\$22,606	\$22,833	\$23,061
20 dollar	\$8,360	\$8,444	\$8,528	\$8,613	\$8,699	\$8,786	\$8,874	\$8,963	\$9,053	\$9,143	\$9,235	\$9,327
Subtotal	\$29,030	\$29,320	\$29,614	\$29,910	\$30,209	\$30,511	\$30,816	\$31,124	\$31,435	\$31,750	\$32,067	\$32,388
Tipping Fee Revenue												
Landfill	\$5,557,804	\$5,580,792	\$5,603,875	\$5,627,053	\$5,650,327	\$5,673,698	\$5,697,165	\$5,720,730	\$5,744,391	\$5,768,151	\$5,792,009	\$5,815,965
Total Revenue	\$9,364,570	\$9,425,625	\$9,430,348	\$9,612,321	\$9,675,448	\$9,739,070	\$9,803,191	\$9,867,815	\$9,932,948	\$9,998,593	\$10,064,756	\$10,131,440

Note: Based on existing rates and fees: revenues would be substantially higher with increased fees or PAYT rates as shown in Table 3-1.

12.6 Operating Expenses

12.6.1 FY 2020-2029 Projected Expenses

Annual operating expenses include direct salary costs, fringe benefits, equipment, and current expenses for collection, RTS, disposal, recycling and green waste operations provided by the Division. The key assumptions used in the projection of operating expenses are as follows:

- FY 2020 and FY 2021 budget data were used as basis for projections.
- Financial assurance (landfill closure) costs were increased to \$1.4 million in FY 2021.
- General inflation for the study period is assumed to be 3.0 percent.
- Benefit increases of 5.0 percent per year.
- Salary increases of 2.5 percent per year.
- Utility cost increases of 2.0 percent per year.
- Landfill closure costs increases of 2.2 percent per year.

Table 12-8 summarizes the Division's projected operating expenses. Operating expenses are projected to increase from approximately \$22.7 million in FY 2021 to nearly \$30.0 million in FY 2030, an average increase of 3.1 percent per year.

Figure 12-2 presents FY 2021 operating expenses by division. Total expenses are estimate at \$22.7 million. Solid waste disposal accounts for 45 percent of operating expenses while solid waste collection (which includes RTS operations) represents 30 percent of total expenditures. Recycling programs are nearly \$5 million of expenses, or 21 percent of total. The roads and maintenance division represent the remaining 4 percent of expenses.

Table 12-8. Projected Division Operating Expenses Fiscal Years 2020-2030

Division	Budget		Projected								
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Solid Waste Disposal	\$9,709,121	\$10,172,304	\$10,479,668	\$10,796,925	\$11,124,420	\$11,462,509	\$11,811,561	\$12,171,962	\$12,544,109	\$12,928,417	\$13,325,315
Solid Waste Collection	\$6,627,577	\$6,784,695	\$7,007,031	\$7,237,298	\$7,475,805	\$7,722,874	\$7,978,840	\$8,244,054	\$8,518,879	\$8,803,697	\$9,098,904
Solid Waste Recycling	\$4,960,862	\$4,876,488	\$5,023,360	\$5,174,676	\$5,330,573	\$5,491,190	\$5,656,671	\$5,827,164	\$6,002,823	\$6,183,805	\$6,370,273
Roads & Auto Maintenance	\$893,806	\$893,814	\$922,220	\$951,578	\$981,922	\$1,013,289	\$1,045,715	\$1,079,238	\$1,113,898	\$1,149,735	\$1,186,794
Subtotal	\$22,191,366	\$22,727,301	\$23,432,278	\$24,160,477	\$24,912,720	\$25,689,862	\$26,492,787	\$27,322,418	\$28,179,709	\$29,065,654	\$29,981,285

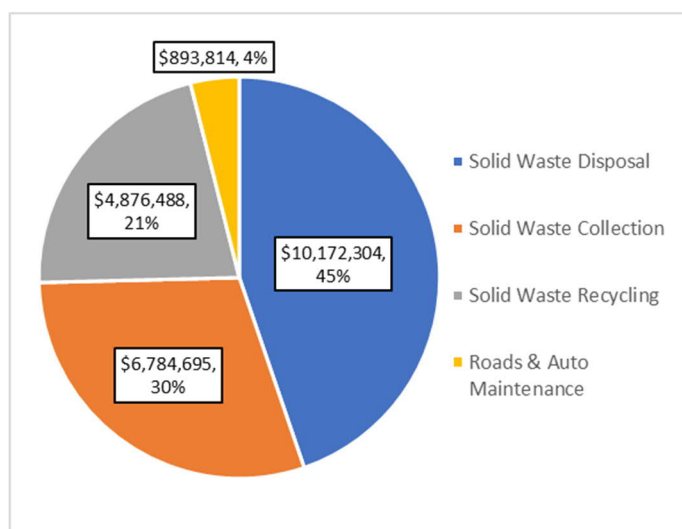


Figure 12-2. Operating Expenditures by Division, Mayor's Budget Request FY 2021

12.6.2 Residential Collection Expense

Residential collection costs are based on providing services to the Division's 22,400 customers as of FY 2019. Residential collection costs also include internal administrative costs, and costs associated with collecting bulky items and depositing them at the County landfill. Costs that were split between residential and commercial collection were allocated approximately 98 percent to residential and 2 percent to commercial. This split is based on the percent of residential customers as compared to the total number of customers served by the Division.

12.6.3 Commercial Collection Expenses

Commercial collection costs are based on providing services to the Division's 269 commercial customers in FY 2019 and internal administrative costs. As mentioned above, costs that were split between residential and commercial collection were allocated 98 percent to residential and 2 percent to commercial. This split is based on the percent of commercial customers as compared to the total number of customers served by the Division.

12.6.4 RTS Expenses

RTS costs are based on providing service at the Division's four RTSs and internal administrative costs.

12.6.5 Landfill Expenses

Landfill expenses include post closure fees, the cost of landfill operations (prior to December 2019, this was a fee paid to Waste Management for operations of the landfill), the solid waste surcharge paid to the State, and internal administrative costs.

12.6.6 Recycling Expenses

Recycling expenses include the contract to operate the Kaua'i Recycles drop-off sites, HHW program, public education, electronics recycling, white goods hauling and Kaua'i Recycle Center, as well as internal administrative costs.

12.6.7 Green Waste Expense

Green waste expenses include allocated costs of transferring green waste at County RTSs, green waste processing by contractors, internal administrative costs, salaries, and equipment costs.

12.7 Capital Expenditures and Debt Service, FY 2021 – 2030

Capital expenditures are based on a combination of the Division’s project-specific capital expenditure budget for the time period FY 2020 to FY 2030, which are based on existing operating conditions, and additional capital expenditures identified in the Plan. Debt service payments include existing debt service as well as projected debt service for future capital expenditures.

The key assumptions used in the projections of capital expenditures and funding sources are as follows:

- Existing debt service for loan repayment for the Gas Collection & Control System for the Kekaha Landfill project. Annual debt service payments including principal, interest, and loan fee are approximately \$257,000 in FY 2021.
- Existing debt service for loan repayment for the Cell 2 Expansion at the Kekaha Landfill. Annual debt service payments including principal, interest, and loan fee are approximately \$756,000 in FY 2021.
- Existing debt service for loan repayment for improvements at County RTSs. The Clean Water State Revolving Fund loan is estimated to have annual debt service payments including principal, interest and loan fee of approximately \$42,000 in FY 2021.
- Capital expenditures over the planning period include improvements at RTSs (outlined in Section 9) at a cost of \$16.4 million. The County-funded portion of the project is estimated at \$2.0 million. The remaining funds are assumed to come from a Clean Water State Revolving Fund Program loan, which is assumed to be issued at a rate of 0.25 percent with a repayment period of 20 years and an annual loan fee of 1.0 percent. Debt service payments including principal, interest, and loan fee are forecast to begin in FY 2021 and are estimated at approximately \$883,000 in FY 2021.

Table 12-9 summarizes the projected debt service for the period FY 2021 through FY 2030.

Table 12-9. Projected Debt Service Fiscal Years FY 2021-2030

Year	Gas Collection & Control System-Kekaha Landfill (NPS0047-11)	CWSRF Kekaha Landfill Cell 2 Extension	BMP Improvements at Various Refuse Stations (NPS0059-25)	CWSRF BMP Improvements at Various Refuse Stations	Total
2021	\$256,853	\$755,892	\$41,898	\$883,049	\$1,937,693
2022	\$256,855	\$749,874	\$41,554	\$876,019	\$1,924,302
2023	\$256,857	\$743,841	\$41,209	\$868,971	\$1,910,877
2024	\$256,859	\$737,793	\$40,863	\$861,905	\$1,897,419
2025	\$256,861	\$731,729	\$40,516	\$854,822	\$1,883,928
2026	\$256,863	\$725,651	\$40,168	\$847,721	\$1,870,402
2027	\$256,865	\$719,557	\$39,819	\$840,602	\$1,856,843
2028	\$256,867	\$713,448	\$39,470	\$833,465	\$1,843,250
2029	\$256,869	\$707,324	\$39,119	\$826,311	\$1,829,623
2030	\$256,871	\$701,184	\$38,768	\$819,139	\$1,815,962

Notes:

BMP = best management practices

CWSRF = Clean Water State Revolving Fund

It is assumed that all of the capital expenditures will be funded through a combination of short-term and long-term debt. It is assumed that the Division will be responsible for all future debt service payments. Note the debt service is not equal in each year (as a home mortgage would be), because loan fees vary by year.

12.8 Projected Operating Statement With Existing Rates and Fees

The previous sections summarize the individual components of the financial plan including:

- Customer and quantity projections.
- Revenue projections.
- Operating expense projections.
- Capital expenditure and financing projections.
- ISWMP projected expenditures.

Table 12-10 summarizes the Division's revenues and expenses with existing rates and fees. As shown, at current levels of collection fees, RTS coupons, and landfill tipping fees, required revenues from the General Fund are projected to increase from approximately \$16.4 million in FY 2021 to approximately \$21.5 million by FY 2030.

Table 12-10. Projected Operating Statement with Existing Rates and Fees

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Expenditures										
Operating Expenses										
Solid Waste Disposal	\$10,172,304	\$10,479,668	\$10,796,925	\$11,124,420	\$11,462,509	\$11,811,561	\$12,171,962	\$12,544,109	\$12,928,417	\$13,325,315
Solid Waste Collection	\$6,784,695	\$7,007,031	\$7,237,298	\$7,475,805	\$7,722,874	\$7,978,840	\$8,244,054	\$8,518,879	\$8,803,697	\$9,098,904
Solid Waste Recycling	\$4,876,488	\$5,023,360	\$5,174,676	\$5,330,573	\$5,491,190	\$5,656,671	\$5,827,164	\$6,002,823	\$6,183,805	\$6,370,273
Roads & Auto Maintenance	\$893,814	\$922,220	\$951,578	\$981,922	\$1,013,289	\$1,045,715	\$1,079,238	\$1,113,898	\$1,149,735	\$1,186,794
Subtotal	\$22,727,301	\$23,432,278	\$24,160,477	\$24,912,720	\$25,689,862	\$26,492,787	\$27,322,418	\$28,179,709	\$29,065,654	\$29,981,285
Capital										
County-Funded Capital	\$2,000,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Debt Service	\$1,937,693	\$1,924,302	\$1,910,877	\$1,897,419	\$1,883,928	\$1,870,402	\$1,856,843	\$1,843,250	\$1,829,623	\$1,815,962
Subtotal	\$3,937,693	\$1,924,302	\$1,910,877	\$1,897,419	\$1,883,928	\$1,870,402	\$1,856,843	\$1,843,250	\$1,829,623	\$1,815,962
ISWMP Implementation										
ISWMP O&M	\$30,900	\$1,559,735	\$639,245	\$754,091	\$707,157	\$680,610	\$701,028	\$722,059	\$743,721	\$766,032
Debt Service	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal	\$30,900	\$1,559,735	\$639,245	\$754,091	\$707,157	\$680,610	\$701,028	\$722,059	\$743,721	\$766,032
Total Expenses	\$26,695,894	\$26,916,315	\$26,847,190	\$27,564,231	\$28,280,946	\$29,043,799	\$29,880,289	\$30,745,018	\$31,638,998	\$32,563,279
Revenues										
Operating Revenues										
Residential Refuse Collection	\$3,536,759	\$3,572,126	\$3,607,848	\$3,643,926	\$3,680,365	\$3,717,169	\$3,754,341	\$3,791,884	\$3,829,803	\$3,868,101
Commercial Refuse Collection	\$260,101	\$383,232	\$387,064	\$390,935	\$394,844	\$398,793	\$402,781	\$406,808	\$410,877	\$414,985
Coupons	\$29,614	\$29,910	\$30,209	\$30,511	\$30,816	\$31,124	\$31,435	\$31,750	\$32,067	\$32,388
Landfill Tipping Fees	\$5,603,875	\$5,627,053	\$5,650,327	\$5,673,698	\$5,697,165	\$5,720,730	\$5,744,391	\$5,768,151	\$5,792,009	\$5,815,965
Subtotal	\$9,430,348	\$9,612,321	\$9,675,448	\$9,739,070	\$9,803,191	\$9,867,815	\$9,932,948	\$9,998,593	\$10,064,756	\$10,131,440
Other Revenues										
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
General Fund Subsidy	\$17,265,546	\$17,303,994	\$17,171,742	\$17,825,161	\$18,477,756	\$19,175,984	\$19,947,341	\$20,746,425	\$21,574,242	\$22,431,840
Subtotal	\$17,265,546	\$17,303,994	\$17,171,742	\$17,825,161	\$18,477,756	\$19,175,984	\$19,947,341	\$20,746,425	\$21,574,242	\$22,431,840
Total Revenues	\$26,695,894	\$26,916,315	\$26,847,190	\$27,564,231	\$28,280,946	\$29,043,799	\$29,880,289	\$30,745,018	\$31,638,998	\$32,563,279
% of Total Expenses from General Fund	65%	65%	64%	65%	65%	66%	67%	67%	68%	69%

12.9 Cost-of-Service Analysis

12.9.1 FY 2021 Cost-of-Service Results

Cost-of-Service studies are used to estimate the actual cost of providing public service by estimating a usage-based allocation of required revenue to identified cost centers. The allocation among the various cost centers considers direct costs that are associated with the cost center, such as labor, equipment and supplies, as well as indirect or overhead costs. By allocating costs in this way, the County can use this information to devise a system of rates and fees that appropriately recover costs from customers that are benefiting from the services of the respective cost center.

Budgeted FY 2021 operating and maintenance expenditures of the Division and capital expenditures were allocated to the following cost centers: collection, RTSs, landfill, recycling, and green waste. Collection costs were allocated between residential and commercial customers. Then cost centers were combined to show cost-of-service rates for each of the County's main solid waste charges (monthly collection, RTS coupons, and landfill tip fee).

Table 12-11 presents the different allocation percentages used to assign each line item in the operating budget to a specific division. Some of the line items were allocated 100 percent to a division while other costs were allocated across multiple divisions. For those line items that were shared with multiple divisions, the allocation rationale is presented in the last column of the table.

Table 12-12 summarizes the total costs, units of service and unit costs for each of the cost centers. These results represent the baseline operating scenario.

Table 12-11. Allocation of Operations and Maintenance Costs to System Divisions

Allocation Method	Residential Collection	Commercial Collection	Transfer Station	Landfill	Green Waste	Recycling
Accounts	98.4%	1.6%	0.0%	0.0%	0.0%	0.0%
MSW Waste Collected	98.4%	1.6%	0.0%	0.0%	0.0%	0.0%
SW Disposal Salary	7.2%	0.1%	8.0%	78.9%	1.3%	4.5%
SW Collection Salary	39.2%	0.7%	55.6%	0.0%	4.5%	0.0%
Collection System Allocation	49.2%	0.8%	45.0%	0.0%	5.0%	0.0%
Green Waste/Recycling	0.0%	0.0%	0.0%	0.0%	28.0%	72.0%
General Allocation	11.9%	0.1%	17.5%	41.2%	8.7%	20.6%
Leased Equipment Collection System	52.4%	0.9%	45.8%	0.0%	0.9%	0.0%

Table 12-12. FY 2021 Operating Cost-of-Service by Cost Center

Division	Cost	Unit of Service	Unit	\$/Unit
Residential Collection	\$3,604,003	\$22,468	Accounts	\$13.37 per Account/mo
Commercial Collection	\$59,202	\$274	Accounts	\$17.98 per Account/mo
Total Collection	\$3,663,205	\$22,742	Accounts	\$13.42 per Account/mo
Transfer Station	\$3,632,520	\$40,404	Tons	\$90 per ton
Landfill	\$9,871,430	\$94,980	Tons	\$104 per ton
Recycling	\$3,866,241	\$47,553	Tons	\$81 per ton
Green Waste	\$1,693,905	\$20,040	Tons	\$85 per ton
Total	\$22,727,301	22,742	Accounts	\$83 per Account/mo

Notes:

mo = month

SW = solid waste

12.9.2 Projected Future Cost-of-Service Unit Costs and Rates

Table 12-13 presents the projected cost-of-service unit costs for each cost center from FY 2021 to FY 2030. Division costs include operations and maintenance, capital expenses, and estimated ISWMP implementation costs.

Table 12-14 shows cost-of-service rates for collection, RTS coupons, and the landfill tipping fee from FY 2021 to FY 2030.

In both of these tables, cost of service means there would be no revenues required from the General Fund.

Table 12-13. Projected Cost-of-Service Unit Costs by Cost Center

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential Collection										
Division Costs	\$3,604,003	\$3,715,796	\$3,831,270	\$3,950,558	\$4,073,794	\$4,201,119	\$4,332,678	\$4,468,624	\$4,609,113	\$4,754,310
Tons	27,795	28,073	28,353	28,637	28,923	29,213	29,505	29,800	30,098	30,399
\$/Ton	\$129.66	\$132.36	\$135.13	\$137.95	\$140.85	\$143.81	\$146.85	\$149.95	\$153.14	\$156.40
Accounts	22,468	22,693	22,920	23,149	23,380	23,614	23,850	24,089	24,330	24,573
\$/Account/mo	\$13.37	\$13.65	\$13.93	\$14.22	\$14.52	\$14.83	\$15.14	\$15.46	\$15.79	\$16.12
Commercial Collection										
Division Costs	\$59,202	\$61,039	\$62,935	\$64,895	\$66,919	\$69,011	\$71,172	\$73,405	\$75,713	\$78,098
Tons	47,744	48,437	49,142	49,858	50,586	51,325	52,077	52,841	53,618	54,993
\$/Ton	\$1.24	\$1.26	\$1.28	\$1.30	\$1.32	\$1.34	\$1.37	\$1.39	\$1.41	\$1.42
Accounts	274	277	280	283	286	288	291	294	297	300
\$/Account/mo	\$17.98	\$18.35	\$18.74	\$19.13	\$19.53	\$19.94	\$20.36	\$20.79	\$21.23	\$21.69
Transfer Stations										
Division Costs	\$6,557,468	\$4,662,770	\$4,771,765	\$4,884,585	\$5,001,366	\$5,122,249	\$5,247,382	\$5,376,917	\$5,511,014	\$5,649,836
Tons	40,404	40,923	41,450	41,985	42,527	43,078	43,636	44,203	44,777	45,674
\$/Ton	\$162.30	\$113.94	\$115.12	\$116.34	\$117.60	\$118.91	\$120.25	\$121.64	\$123.08	\$123.70
Landfill										
Division Costs	\$10,884,175	\$12,516,002	\$11,625,744	\$11,950,363	\$12,413,419	\$12,835,729	\$13,200,369	\$13,577,320	\$13,967,023	\$14,369,934
Tons	93,750	94,955	96,178	97,419	98,678	99,955	101,250	102,564	103,898	105,979
\$/Ton	\$116.10	\$127.06	\$131.81	\$122.67	\$125.80	\$128.42	\$130.37	\$132.38	\$134.43	\$135.59
Green Waste										
Division Costs	\$1,693,905	\$1,746,448	\$1,800,722	\$1,856,788	\$1,914,709	\$1,974,553	\$2,036,386	\$2,100,282	\$2,166,313	\$2,234,556
Tons	20,559	20,824	21,093	21,366	21,643	21,924	22,209	22,654	23,108	23,570
\$/Ton	\$82.39	\$83.87	\$85.37	\$86.90	\$88.47	\$90.06	\$91.69	\$92.71	\$93.75	\$94.80
Recycling										
Division Costs	\$3,897,141	\$4,214,261	\$4,754,754	\$4,857,042	\$4,810,739	\$4,841,139	\$4,992,301	\$5,148,469	\$5,309,822	\$5,476,544
Tons	47,553	48,167	48,789	49,420	50,061	50,711	51,370	52,399	53,449	54,519
\$/Ton	\$81.95	\$87.49	\$97.46	\$98.28	\$96.10	\$95.47	\$97.18	\$98.26	\$99.34	\$100.45
Total										
Cost	\$26,695,894	\$26,916,315	\$26,847,190	\$27,564,231	\$28,280,946	\$29,043,799	\$29,880,289	\$30,745,018	\$31,638,998	\$32,563,279
Accounts	22,742	22,970	23,200	23,432	23,666	23,902	24,142	24,383	24,627	24,873
\$/Account/mo	\$97.82	\$97.65	\$96.44	\$98.03	\$99.58	\$101.26	\$103.14	\$105.08	\$107.06	\$109.10

Table 12-14. Projected Cost-of-Service Rates, FY 2021-FY 2030

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential Collection and Allocated Transfer Station										
Division Costs	\$9,859,201	\$8,164,077	\$8,383,991	\$8,611,389	\$8,846,539	\$9,089,718	\$9,341,214	\$9,601,325	\$9,870,361	\$10,148,645
Accounts	22,468	22,693	22,920	23,149	23,380	23,614	23,850	24,089	24,330	24,573
\$/Account/mo	\$36.57	\$29.98	\$30.48	\$31.00	\$31.53	\$32.08	\$32.64	\$33.22	\$33.81	\$34.42
Commercial Collection and Allocated Transfer Station										
Division Costs	\$135,598	\$115,366	\$118,539	\$121,819	\$125,210	\$128,716	\$132,342	\$136,092	\$139,970	\$143,980
Accounts	274	277	280	283	286	288	291	294	297	300
\$/Account/mo	\$41.18	\$34.69	\$35.29	\$35.91	\$36.54	\$37.19	\$37.86	\$38.55	\$39.25	\$39.98
Commercial Collection Coupons										
Division Costs	\$225,874	\$160,160	\$163,441	\$166,830	\$170,330	\$173,944	\$177,676	\$181,530	\$185,509	\$189,619
Tons from 10-dollar coupons	1,054	1,065	1,075	1,086	1,097	1,108	1,119	1,130	1,142	1,153
Tons from 20-dollar coupons	320	323	326	329	333	336	339	343	346	350
10-dollar coupons	2,109	2,130	2,151	2,172	2,194	2,216	2,238	2,261	2,283	2,306
20-dollar coupons	426	431	435	439	444	448	453	457	462	466
Coupon rate for current 10-dollar coupons	\$82.19	\$57.70	\$58.30	\$58.92	\$59.56	\$60.22	\$60.91	\$61.61	\$62.34	\$63.09
Coupon rate for current 20-dollar coupons	\$123.29	\$86.55	\$87.45	\$88.38	\$89.34	\$90.33	\$91.36	\$92.42	\$93.51	\$94.63
Landfill with Green Waste and Recycling										
Division Costs	\$16,475,221	\$18,476,711	\$18,181,220	\$18,664,193	\$19,138,867	\$19,651,421	\$20,229,057	\$20,826,072	\$21,443,158	\$22,081,035
Tons	93,750	94,955	96,178	97,419	98,678	99,955	101,250	102,564	103,898	105,979
Landfill Tip Fee (\$/Ton)	\$175.74	\$194.58	\$189.04	\$191.59	\$193.95	\$196.60	\$199.79	\$203.05	\$206.39	\$208.35
Total Cost	\$26,695,894	\$26,916,315	\$26,847,190	\$27,564,231	\$28,280,946	\$29,043,799	\$29,880,289	\$30,745,018	\$31,638,998	\$32,563,279

13. Recommended Action Plan

13.1 Background

As discussed in Section 1, HRS Chapter 342G requires each county to develop a Plan and revise the Plan once every 10 years, provided that an interim status report is submitted 5 years after every revised Plan submission. The Plan serves as a road map for managing the County's waste by employing strategies that reduce landfilled waste through recycling and other technologies (Sections 3 through 8), and planning for future needs (Sections 9 and 10). Input from the SWAC, County, and public is gathered and considered throughout the development process.

The County has several existing programs and policies that contribute to a relatively stable diversion rate of 43 percent (based on the baseline FY 2019 diversion rate) as discussed in Sections 1 and 2 and presented in Table 13-1. Many of these programs have been in place for over a decade, while some were programs and policies that were implemented as a result of the last Plan which was adopted in 2010. Important program and policy changes that were implemented since the adoption of the last Plan include the following:

- Automated refuse collection.
- A flat fee for refuse service.
- A PAYT program.
- Commercial landfill restrictions.
- A plastic bag law.

Unfortunately, funding was an issue and several of the recommended actions were not implemented, including centralized compost facility, MRF, curbside green waste and recycling, WTE, HHW program expansion, and market development grants.

Considering the historic funding hurdles, this Plan used the following approach in developing and selecting the Enhancement Opportunities/Strategies that were included in the Plan and summarized in Table 13-2:

- Focus on problematic materials and/or materials found in excess in the disposed/landfill waste stream (as identified in the 2016 Waste Characterization Study).
- Build off the success from existing programs and working groups.
- Expand or modify existing programs to gain additional success.
- Consider new enhancement opportunities that would be needed to take diversion to the next level and further support more sustainable strategies.
- Prioritize enhancements that are feasible for the County based on current or slightly increased resource levels.
- Recommend evaluation of implementing major program enhancements in future years to assess feasibility (including cost-effectiveness and siting) and identify funding sources (for example, residential curbside collection of recyclables and a new MRF).

The resulting list of enhancement opportunities/strategies include primarily implementable options, some of which are intended to serve as initial steps that could lead to more progressive options.

13.2 Implementation Plan

Table 13-1 summarizes the ongoing programs, organized by relative Plan section. Table 13-2 summarizes the Enhancement Opportunities/Strategies that have been included and discussed in this Plan. Enhancement Opportunities/Strategies are organized by Plan section. More detailed descriptions for each of these Enhancement Opportunities/Strategies are in the noted section of the Plan.

Table 13-1. Ongoing County Programs

Item	Program
1. Introduction	
1	Continue automated and manual refuse collection for residential and commercial customers.
2	Continue to operate the Kekaha Landfill.
3. Source Reduction	
3	Continue source reduction efforts within County agencies, including reducing printed documents and promoting the use of electronic files over printed, fully using both sides of printed paper, reusing envelopes for internal documents, grass-cycling, and similar.
4	Continue to partner with thrift stores to generate additional reuse options for unsaleable yet usable materials.
5	Continue to publish the Kaua'i Recycling Guide, field calls to the Recycling Office, interact with residents at community events, speaking to school children, and posting information on the County website.
6	Continue to offer free composting bins to residents.
7	Continue to assist businesses with recycling, waste reduction, and waste diversion issues.
8	Continue to enforce the Plastic Bag Reduction ordinance.
9	Continue PAYT system.
4. Recycling and Bioconversion	
10	Continue the Residential Drop Bin Program.
11	Continue operating the KRC.
12	Continue to oversee the DBC Program.
13	Continue accepting materials at RTS.
5. Special Wastes	
14	Continue programs for used oil, lead acid batteries, used tires, white goods, pressurized tanks, and abandoned and derelict vehicles.
6. Household Hazardous Waste and Electronic Waste	
15	Continue to promote waste prevention, safe handling, and proper disposal of HHW through the County's website.
16	Continue to host HHW collection events.
17	Continue to field calls to the County recycling office for how to handle and dispose of HHW.
18	Continue to update information on the County website regarding disposal procedures for residential and commercial generators discarding used electronics.
19	Continue to host eWaste collection contests at schools.
7. Public Education	
20	Continue to staff recycling coordinator and solid waste programs coordinator positions to manage the County's recycling program.
21	Continue to maintain the County website with updated solid waste management programs.

Table 13-1. Ongoing County Programs

Item	Program
22	Continue to directly engage with residents and businesses through the County Recycling telephone line, public drop-ins, facility tours, public presentations, and information booths.
23	Continue to participate in local radio shows to raise awareness of recycling programs.
24	Continue to distribute printed material promoting County programs, including direct mailers, print advertisements, press releases, brochures, stickers, signs, etc.
25	Continue to solicit feedback from the public on County programs through web-based surveys.
26	Continue to engage with state and local schools in various ways, including facility tours for school groups, provision of HI5 recycling bins, school contests, etc.
27	Continue to provide recycling opportunities at County workplaces, including paper recycling, HI5 bins, and non-HI5 bins.
9. Facilities	
28	Continue to implement design and infrastructure improvements to RTS (including work on waste isolation and containment and covered collection areas, traffic and material flow, diverting clean storm water, and managing leachate).

Table 13-2. Planned County Programs

Item	Enhancement Opportunity/Strategy	Planning Horizon	Implementation Difficulty	Year	1	2	3	4	5	6-10
				FY	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Annual, FY 2026-30
3. Source Reduction										
1	Build off and expand policies for plastic and polystyrene reduction and compostable use. ^a	Short-term	Low							
2	Advocate for EPR for potential candidate materials such as fluorescent tubes, paper, packaging, mattresses, and paint. ^a	Medium-term	Easy to Advocate Difficult to Implement							
3	Offer Grant-in-Aid to support "Food Waste to Animal Feed" projects.	Short-term	Low				\$15,000	\$15,000	\$15,000	
4	Recognize and promote the Lodging Industry's source reduction efforts. ^a	Short-term	Low							
5	Support State Plastics Source Reduction Working Group findings related to the use of reusable containers at restaurants. ^a	Medium-term	Medium							
6	Consider a fee increase for PAYT program. ^{a,b}	Long-term	High							
4. Recycling and Bioconversion										
7	Build upon previous curbside recycling collection studies and new MRF feasibility and siting study. ^b	Medium-term	High				\$250,000			
8	Implement curbside recycling and material recovery facility (assuming MRF construction and curbside programs determined to be feasible and funding is secured.)	Long-term	High						TBD	
9	Support DBC (HI5) deposit increase. ^a	Short-term	Easy to Support Difficult to Implement							
10	Evaluate and expand additional commercial disposal restrictions (such as C&D) and identify recycling opportunities for businesses. ^a	Medium-term	High							
11	Support expansion of tiered composting regulations to encourage smaller composting operations. ^a	Short-term	Medium							
12	Design and implement compost demonstration project, then evaluate food waste composting program. ^b	Medium-term	High					\$60,000	\$10,000	
13	Support permit modifications for food waste composting at private facilities and/or issue RFP(s).	Medium-term	Medium				\$25,000	\$25,000		
14	Offer Grant-in-Aid funding for priority recycling and organics projects on-island.	Short-term	Low				\$20,000	\$20,000	\$20,000	\$20,000
15	Issue RFP for pallet processing facility to chip/mulch/market pallets.	Medium-term	Medium					\$15,000	\$15,000	
16	Allocate appropriate resources to hire new staff (1 full-time employee [FTE]) for recycling programs.	Short-term	Medium				\$110,000	\$110,000	\$110,000	\$110,000
17	Co-locate new recycling drop-off sites and HI5 Certified Redemption Centers with existing solid waste facilities when possible. ^a	Short-term	Medium							
5. Special Wastes										
18	Increase public education regarding proper disposal of acetylene tanks. ^a	Short-term	Low							
19	Expand disposal ban to include select C&D materials. ^a	Medium-term	Medium							
20	Prepare County videos to address public education needs for special wastes.	Short-term	Low				Costs included in Section 7			
21	Evaluate opportunities for sewage sludge diversion and act on opportunities if cost-effective and overall beneficial. ^b	Medium-term	High					\$80,000		
22	Implement collection of used cooking oil at Kaua'i Resource Center.	Medium-term	Medium				\$20,000	\$20,000	\$20,000	\$20,000

Table 13-2. Planned County Programs

Item	Enhancement Opportunity/Strategy	Planning Horizon	Implementation Difficulty	Year	1	2	3	4	5	6-10
				FY	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Annual, FY 2026-30
6. Household Hazardous Waste and Electronic Waste										
23	Evaluate a Drop-and-Swap program at the KRC. ^a	Short-term	Medium							
24	Network with automotive stores and repair shops to see how they may be able to directly service the public for managing of automotive fluids/materials. ^a	Short-term	Low							
25	Advocate for EPR for select materials (for example, fluorescent tubes). ^a	Medium-term	Easy to Advocate Difficult to Implement							
26	Assess feasibility of accepting eWaste at RTSs after completion of RTS improvement projects. ^b	Long-term	Medium						\$50,000	
27	Evaluate residential disposal bans on eWaste if it is feasible to accept eWaste at RTSs (see Item #10 for additional bans). ^a	Long-term	Medium to Evaluate Difficult to Implement							See Item #10
7. Public Education										
28	Promote the true cost of solid waste programs. ^a	Short-term	Low							
29	Enhance the school Reduce, Reuse, and Recycle (3R) program. ^a	Medium-term	Low							
30	Evaluate a food waste comprehensive program and use compost and food waste survey results to help guide needs. ^a	Medium-term	Medium							
31	Update the County website with an increased number of image-based posters and videos.	Short-term	Low				\$10,000	\$10,000	\$10,000	
32	Promote the State Green Recognition Program. ^a	Short-term	Low							
33	Develop and Support a Recycling Block Leader Program. ^a	Short-term	Medium							
34	Allocate appropriate resources to hire new staff (1 FTE) public outreach and education (\$20,000/year for expenses and \$110,000/year for resources).	Short-term	Medium				\$130,000	\$130,000	\$130,000	\$130,000
35	Use a business survey process to advertise education needs and focus areas and then target businesses that may require technical assistance. ^a	Short-term	Medium							
8. Materials Marketing										
36	Explore potential for plastic processing innovations. ^b	Medium-term	High				\$60,000			
37	Advance the County recycled product purchasing policy. ^a	Medium-term	Medium							
38	Evaluate on-island recycling opportunities and issue RFPs for select materials, such as dry materials and organics. ^{a,b}	Medium-term	Medium					\$25,000	\$25,000	
39	Promote state compost standards. ^a	Short-term	Medium							
40	Improve County use of recycled glass, organics, and other recycled products. ^a	Medium-term	Medium							
41	Promote enhanced state and federal market development efforts and funding. ^a	Short-term	Low							
9. Facilities										
42	Assess closing landfill and RTSs on Sundays to improve efficiency. ^b	Short-term	Easy to Evaluate Moderate to Difficult to Implement				\$15,000			
43	Continue and enhance RTS staff training program to improve compliance with drop-off restrictions (for example, commercial use, pressurized tanks, and used-oil collection). ^a	Medium-term	Medium							

Table 13-2. Planned County Programs

Item	Enhancement Opportunity/Strategy	Planning Horizon	Implementation Difficulty	Year	1	2	3	4	5	6-10
				FY	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Annual, FY 2026-30
44	Propose an increase to commercial RTS tipping coupon fees. ^a	Short-term	Medium							
45	Improve emergency operating procedures at the Kekaha Landfill. ^a	Short-term	Low							
46	Allocate appropriate resources to hire new staff for landfill operations (County to determine best way to staff and phase in over a few years).	Short-term	Medium				\$120,000	\$120,000	\$230,000	\$290,000
47	Proceed with permitting and design for vertical expansion of Kekaha.	Short-term	Low			\$335,000				
10. Evaluation of Long-Term Disposal Strategies										
48	Conduct a siting study for a new landfill.	Short-term	Medium				\$500,000			
49	WTE/alternative technologies feasibility study.	Short-term	Medium		\$300,000					
50	Continue assessing disposal options and capacity.	Short- to long-term	Medium							

^a Assume no cost for program but requires some staff time. Factor into the additional resources.

^b If implemented, Kaua'i County costs would change (increase or decrease) and those potential cost changes are not shown in this table (see the relevant section for additional information).

Appendix A
Summary of Public Comment and Response

Appendix A. Summary of Public Comments and Responses

The County submitted a Public Review Draft of the Integrated Solid Waste Management Plan (ISWMP) Update on May 19, 2021, which initiated a public review comment period that ran through July 19, 2021. About midway through the review period, on June 17, 2021, the County hosted a virtual Public Hearing to share an overview of the ISWMP Update and collect public oral testimony.

During the public comment period, the County received comments in the following formats:

- 90 written testimonies via email
- 7 oral testimonies (5 of which were sent by individuals that also provided written testimony)
- A letter package from the Kauai Chapter of the Surfrider Foundation from 86 adult residents and 117 children, all requesting that curbside recycling and a material recovery facility (MRF) be added to the ISWMP
- A notice of a “Let’s get Kaua’i Curbside Recycling” Instagram post from Zero Waste Kaua’i that received 418 shares, 349 likes, and 54 comments

Table A-1 summarizes the primary themes of the comments received via oral and written testimony; ordered by frequency received. The sections following the table detail the responses for each major theme.

Table A-1. Public Review Comment Summary

Rank	Comment	# of People that Made Comment	How Comment is Addressed
1	Want goals and prioritized actions that align with a sustainable island <ul style="list-style-type: none"> • Focus on sustainable strategies, circular economy, and zero waste (32) • Set 80% Diversion Goal by 2030 (21) • Want clear goals and prioritized strategies (13) • Address Kaua’i General Plan goal of becoming a sustainable island (6) 	72	Response #1
2	Prioritize curbside recycling	65	Responses #2 and #3
3	Prioritize MRF	51	Responses #2 and #3
4	Prioritize curbside green waste and food waste	35	Response #4
5	Prioritize diversion of Construction & Demolition (C&D) debris	25	Response #5
6	Add staff to support increased recycling and diversion	22	Response #6
7	Against Waste-to-Energy (WTE) as a Kaua’i disposal or processing alternative <ul style="list-style-type: none"> • Don’t prioritize WTE (16) • WTE creates toxic pollution (6) 	22	Response #7
8	Support funding of proposed ISWMP Enhancement Opportunities, including recycling and diversion programs (particularly a MRF and curbside recycling), not WTE	11	Response #8

Comment #1: Want goals and prioritized actions that align with a sustainable island

Response #1: The ISWMP Update already has prioritized strategies for each topic area, which are the enhancement opportunities that were included under each chapter. These enhancement opportunities promote sustainability and the reduction of the waste footprint of the island. Additional text was included to better weave in the importance of prioritizing actions that align with a sustainable island and the associated goal in the 2018 General Plan. An 80 percent diversion goal is not realistic for the County. The County currently has a diversion rate of 43 percent; while implementation of the enhancement opportunities included in the ISWMP Update will improve the diversion rate, the existing State Aloha + Challenge solid waste reduction goal of 70 percent by 2030 is enough of a reach to strive for and can be re-evaluated as the County successfully implements these plans. Significantly increasing waste diversion will require substantial system changes, which include implementation of curbside recycling, construction of a new material recovery facility, new legislation, staff resources, and many other improvements. These items are each discussed in length in the relative sections of the plan.

Comments #2 and #3: Prioritize curbside recycling and prioritize MRF

Responses #2 and #3: Section 4 was updated to more clearly to describe the work that was previously conducted to study the implementation of curbside recycling and the siting and construction of an MRF. The section also further describes why new studies are needed. While both of these items were also included in the 2010 plan and have been studied previously, additional research to support those studies is needed to update outdated information and changed conditions and assure the County plans appropriately in the future budgets.

Comment #4: Prioritize curbside green waste and food waste

Response #4: There are many green waste and food waste recommendations already in the ISWMP Update and the County currently has good diversion in this area. No additional information will be added.

Comment #5: Prioritize diversion of C&D debris

Response #5: The Public Review Draft discussed C&D diversion in several sections, including Sections 4, 5, and 8. These sections were modified to better connect the subject material. Section 4.4.3 of the ISWMP Update, Evaluate Additional Commercial Disposal Restrictions (such as C&D) and Identify Recycling Opportunities for Businesses, discusses an enhancement opportunity that was already largely focused on describing a method for diverting specific types of C&D. The section was revised slightly.

Section 5.3.2, Expand Disposal Bans to Include Select C&D Materials, was also revamped to more clearly describe the process for implementing this enhancement opportunity and to connect Sections 4.4.3 and 5.3.2 and the market development of C&D materials discussed in Section 8.3.9 and the enhancement to evaluate on-island recycling opportunities and issue requests for proposal (RFPs) for select materials discussed in Section 8.4.3.

Comment #6: Add staff to support increased recycling and diversion

Response #6: The ISWMP Update already had three different enhancement opportunities to add new staff (for recycling programs, public outreach and education, and landfill operations). These all included the word “resources.” These enhancement opportunities have been renamed and the associated text has been revised slightly to clarify the number of new staff recommended.

Comment #7: Against Waste-to-Energy (WTE) as a Kaua‘i disposal or processing alternative

Response #7: The County’s current disposal option, Kekaha Landfill, is expected to reach capacity in June 2027 or in November 2030 if vertical expansion is completed. In either case, the County needs to explore all options for disposal and processing of waste.

The County is in the process of contracting a consultant to assess whether alternative technologies could feasibly be used to divert waste from the landfill. While alternative technologies have been examined in the past, they are being evaluated again because technologies continue to change, and all long-term disposal options should be considered. Technologies to be assessed as part of the feasibility study include thermochemical conversion (that is, conventional WTE, pyrolysis, or gasification), physicochemical conversion (that is, refuse-derived-fuel generation), and biochemical conversion (that is, anaerobic digestion). Based on the results of the study, the County may proceed with an RFP to further evaluate feasible technologies. The initial study of these technologies will commence in fiscal year 2022.

Comment #8: Support funding of proposed ISWMP enhancement opportunities, including recycling and diversion programs (particularly a MRF and curbside recycling), not WTE

Response #8: Changes previously made per Comments 1 through 7 address this comment.